Exhibit A

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Blank et al.

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(54) **COLUMNAR ADHESIVE LABEL ROLL**

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(73) Assignee: **NCR Corporation**, Dayton, OH (US)

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(51) **Int. Cl.**
B32B 9/00 (2006.01)
B65D 65/28 (2006.01)
B32B 7/12 (2006.01)

(52) **U.S. Cl.** **428/40.1**; 428/41.8; 428/42.1; 428/43; 428/343; 428/906

(58) **Field of Classification Search** 428/40.1, 428/41.8, 194, 42.1, 43, 195.1, 343, 906; 283/81

See application file for complete search history.

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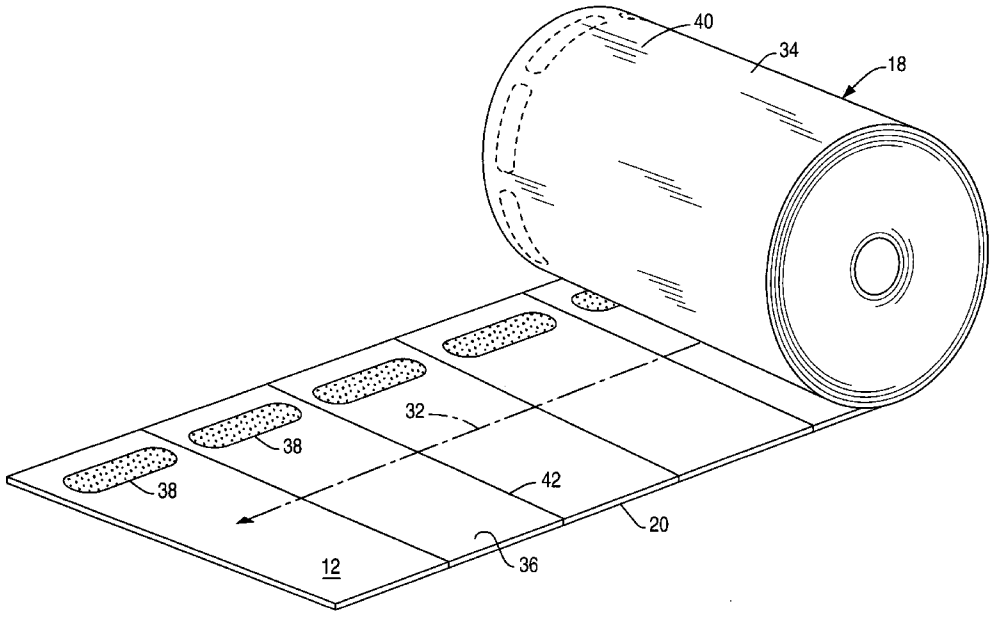
(57) **ABSTRACT**

A label roll includes a web having front and back surfaces wound in a roll. The back surface includes adhesive patches aligned in a column along the running axis of the web. The front surface includes a release strip behind the column of patches and laminated thereto in successive layers in the roll.

44 Claims, 6 Drawing Sheets



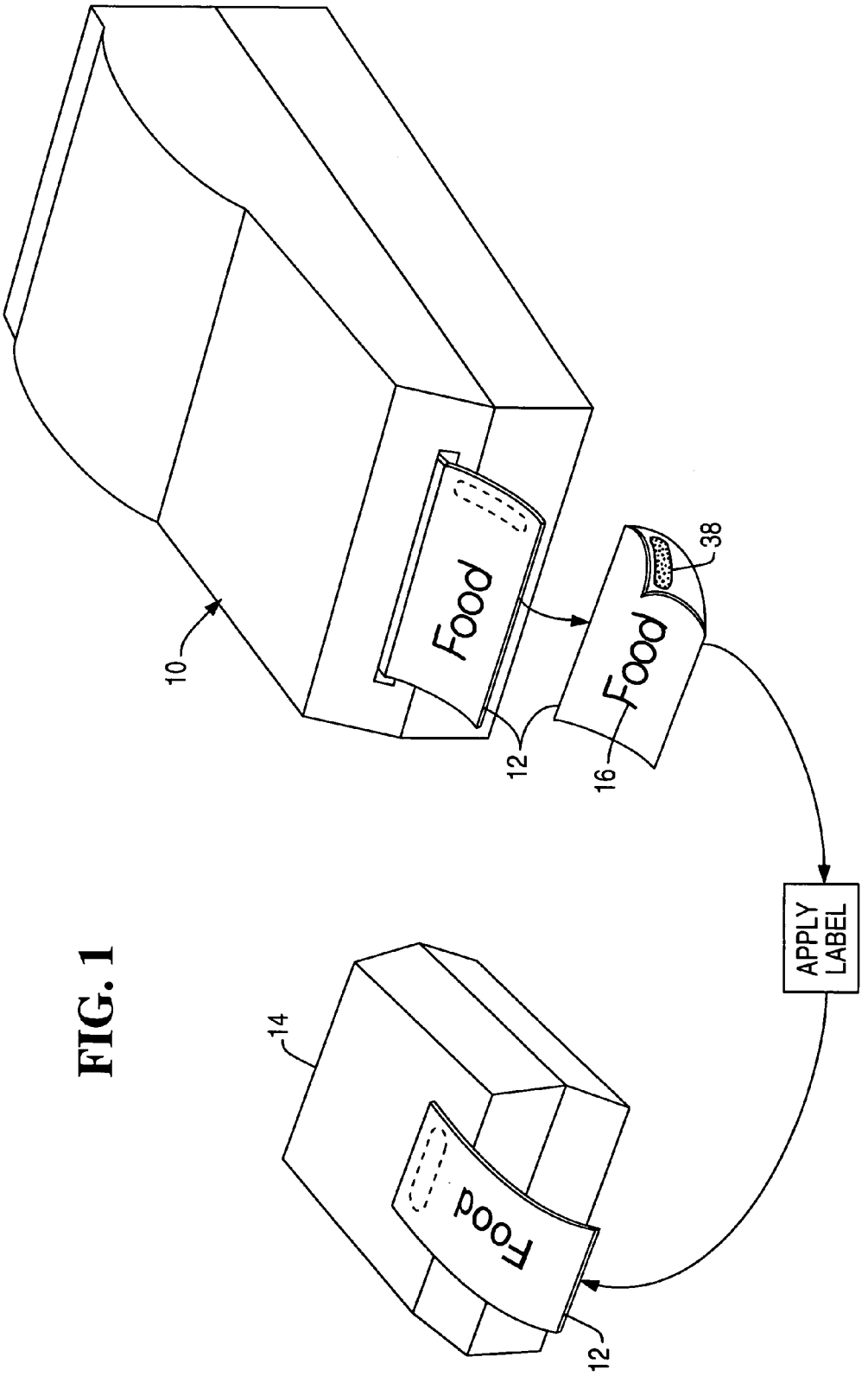


FIG. 1

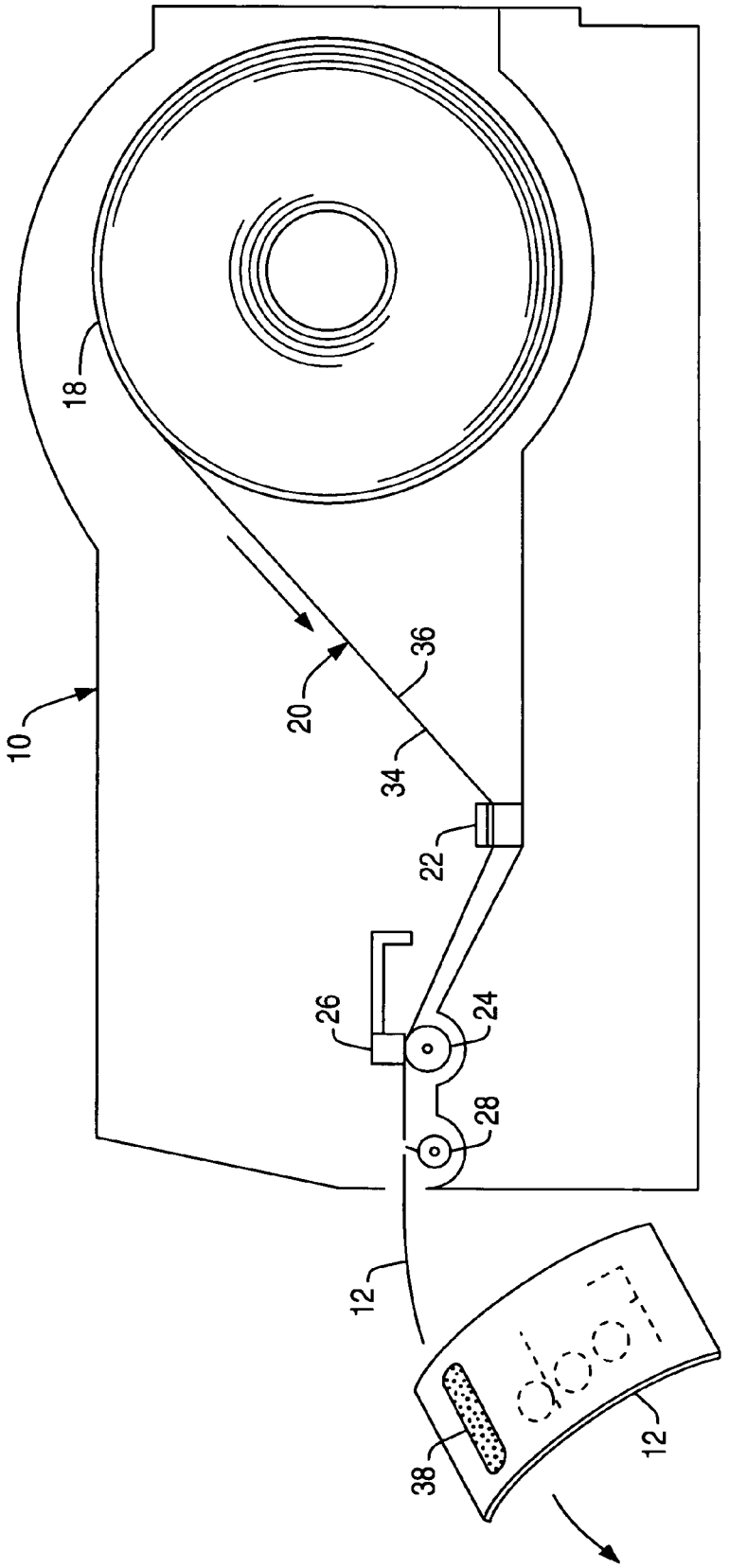


FIG. 2

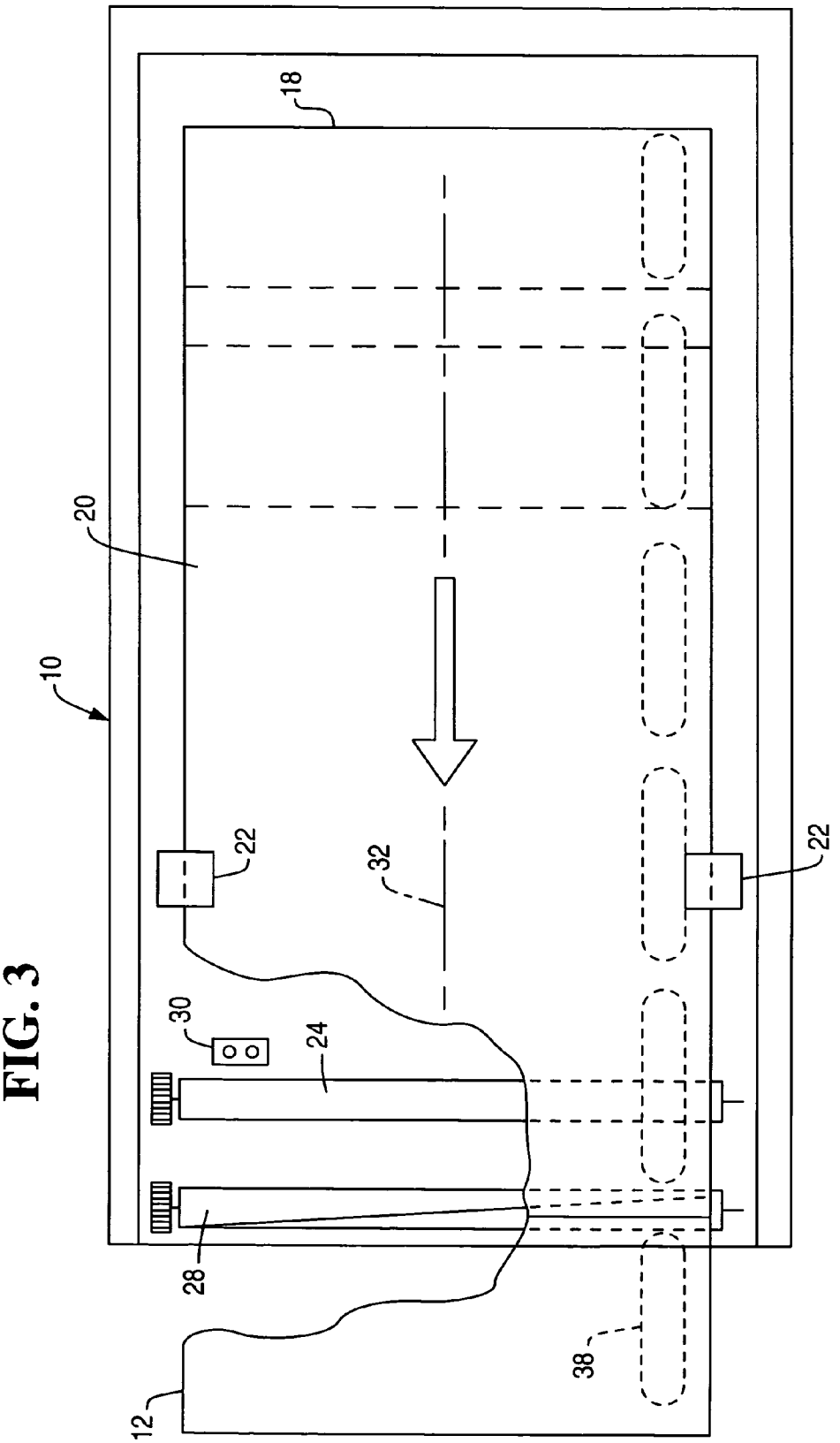


FIG. 3

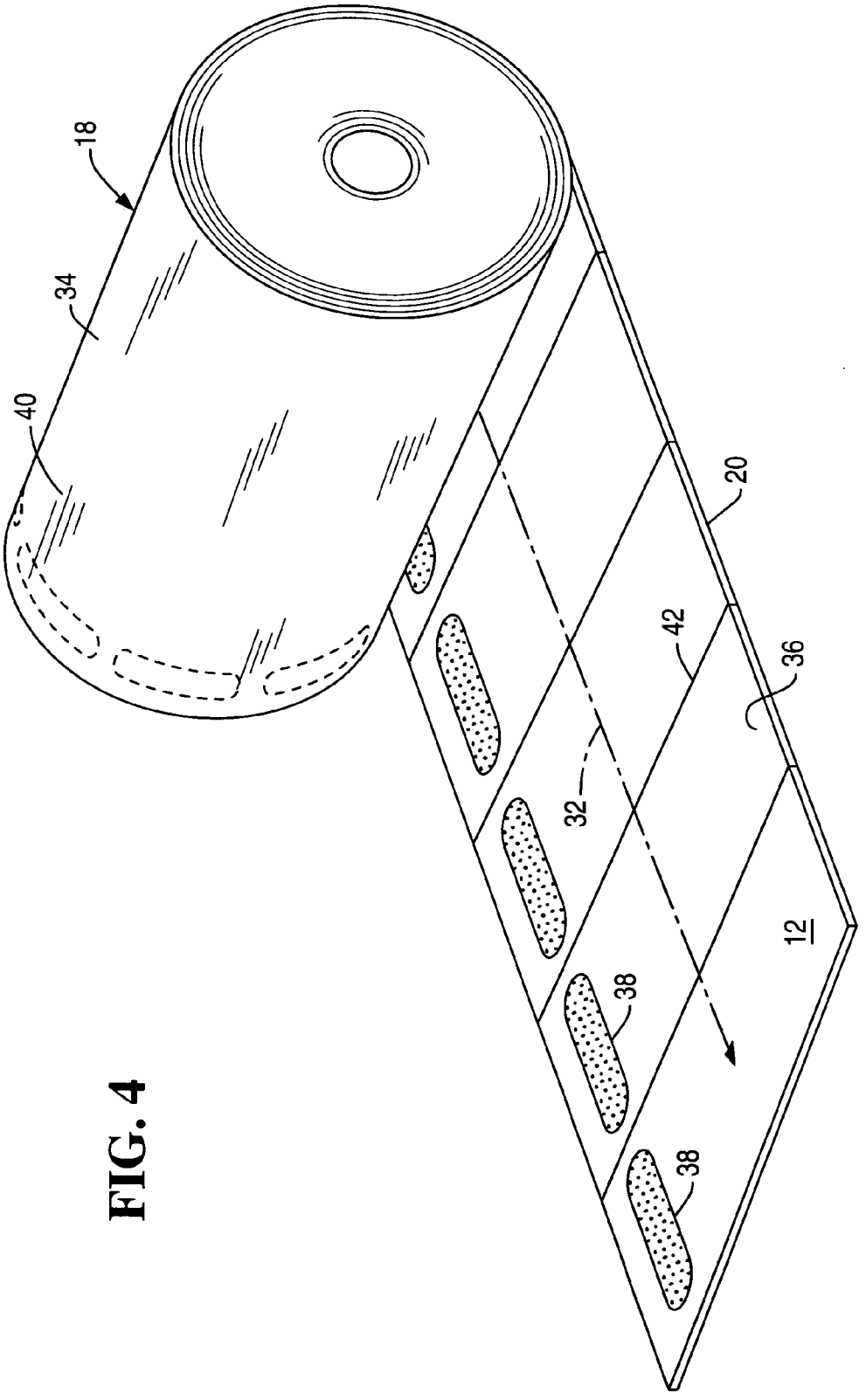


FIG. 4

FIG. 5

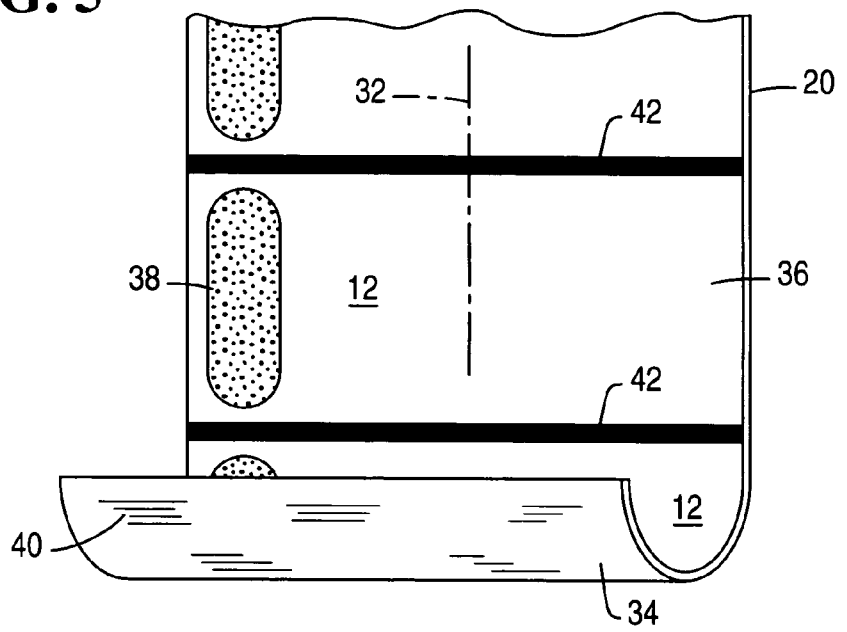


FIG. 6

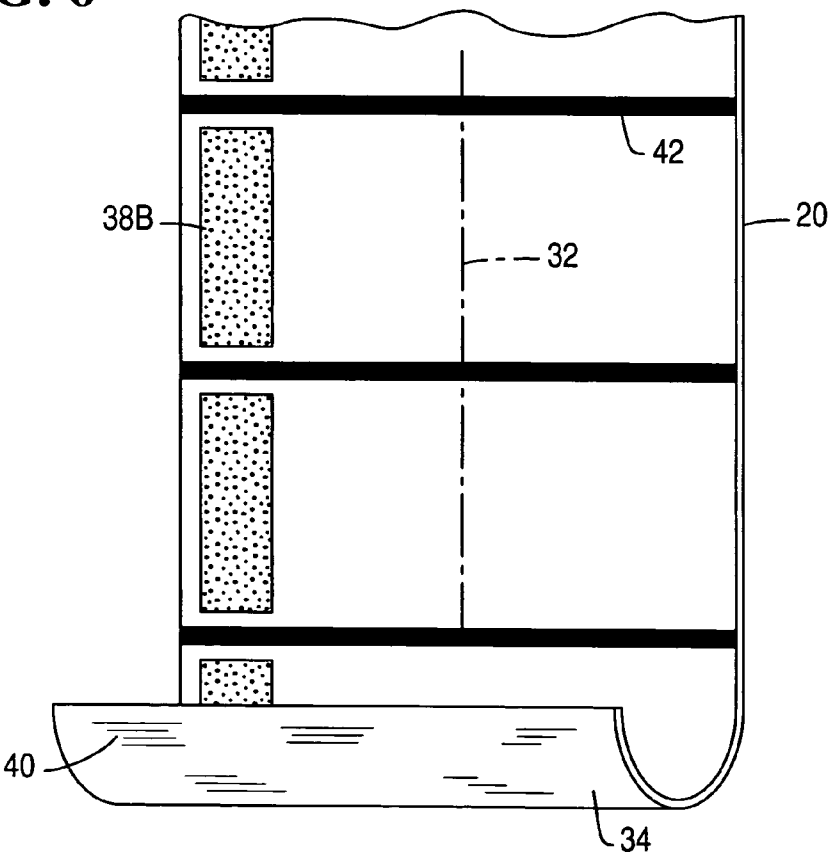


FIG. 7

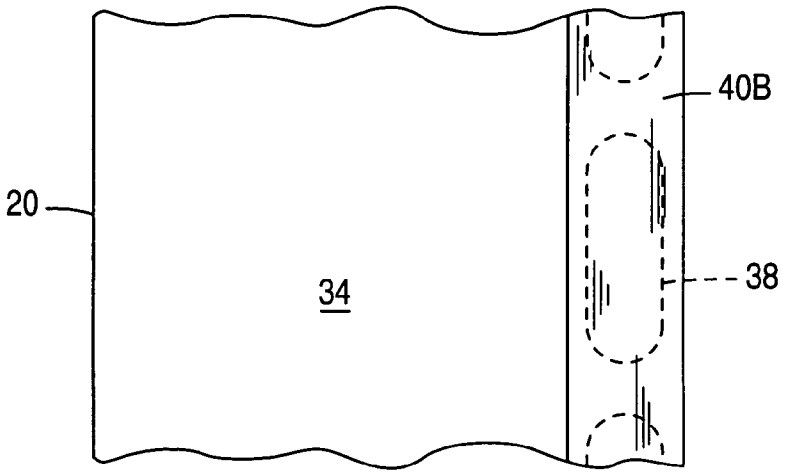
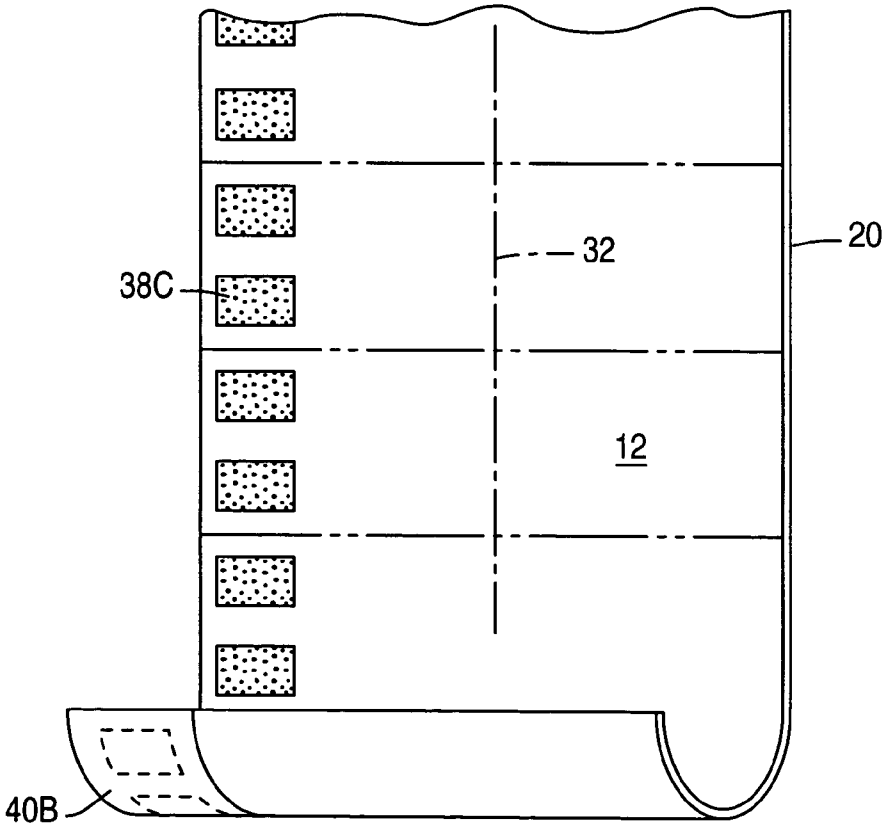


FIG. 8



COLUMNAR ADHESIVE LABEL ROLL

BACKGROUND OF THE INVENTION

The present invention relates generally to stationery products, and, more specifically, to adhesive labels.

The ubiquitous adhesive label is available in a myriad of configurations for use in various applications, including specialty applications. The typical adhesive label includes pressure sensitive adhesive on its back side initially laminated to an underlying release liner. The release liner is typically coated with silicone to provide a weak bond with the adhesive for permitting the individual removal of labels from the liner when desired.

Adhesive labels may be found in individual sheets, or joined together in a fan-fold stack, or in a continuous roll. Label rolls are typically used in commercial applications requiring high volume use of labels.

More specifically, in the fast food industry specialty labels may be used in identifying individual food products in typical sales transactions. The label roll may be formed of thermal paper for sequential printing of individual labels in a direct thermal printer. Or, a thermal transfer printer may also be used.

The typical pressure sensitive adhesive label includes full surface adhesive on its back side which may interfere with the handling thereof during the food preparation process. An individual label identifying the corresponding food product is removed from the printer by the user who typically wears sanitary gloves. The label may inadvertently bond to the gloves, and this increases the difficulty of placing the label on the packaging for the intended food product.

Furthermore, the liner material used in the label roll results in waste, and correspondingly affects the cost of the roll. Linerless label rolls are conventionally known in which the front surface of the label web may be coated with a suitable release material, such as silicone, for providing an integrated liner in the web itself without the need for an additional liner sheet.

However, as the linerless web is unwound in the printer, the back side adhesive is exposed to the various parts of the printer and can inadvertently bond thereto leading to undesirable jamming of the printer.

Furthermore, the printer may include a typical cutting knife or cutting bar for cutting individual labels from the continuous web. The exposed adhesive on the linerless label roll therefore permits adhesive buildup on these cutting elements during prolonged operation of the printer.

Adhesive buildup on any of the various components of the printer contacting the adhesive side of the label is undesirable because it requires periodic cleaning or other maintenance to avoid printer jamming, which may nevertheless occur.

Accordingly, it is desired to provide an improved linerless label roll.

BRIEF SUMMARY OF THE INVENTION

A label roll includes a web having front and back surfaces wound in a roll. The back surface includes adhesive patches aligned in a column along the running axis of the web. The front surface includes a release strip behind the column of patches and laminated thereto in successive layers in the roll.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, in accordance with preferred and exemplary embodiments, together with further objects and advantages thereof, is more particularly described in the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. **1** is an isometric view of a thermal printer dispensing pressure sensitive labels in an exemplary application.

FIG. **2** is a side elevational internal view of the printer shown in FIG. **1** illustrating exemplary components along the feedpath of the label roll mounted therein.

FIG. **3** is a top view inside the printer illustrated in FIG. **2** showing dispensing of the label roll therethrough.

FIG. **4** is a isometric view of the label roll illustrated in FIGS. **1-3** in accordance with an exemplary embodiment.

FIG. **5** is a back side view of the label roll illustrated in FIG. **4** in more detail.

FIG. **6** is a back side view of a portion of the label roll in accordance with an alternate embodiment.

FIG. **7** is a front side view of a portion of the label roll in accordance with an alternate embodiment.

FIG. **8** is a back side view of a portion of the label roll in accordance with an alternate embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Illustrated in FIG. **1** is a conventional printer **10** configured for printing in sequence individual labels **12** for use in an exemplary fast food application. For example, food may be placed in a suitable food package **14** such as the paper box illustrated, or simple wrapping paper (not illustrated).

Print or identifying indicia **16** is printed on the label in the printer for identifying the contents of the package, for example. The individual printed label may then be removed from the printer and applied to the food package **14** as illustrated in the exemplary method shown in FIG. **1**.

FIG. **2** illustrates certain elements along the feedpath of the printer **10**, which may otherwise have any conventional configuration, such as a direct thermal printer, or alternatively a thermal transfer printer. A label roll **18** is suitably mounted inside the printer either in a tray therefor, or on a support spindle extending through the center core thereof. The roll includes a continuous, elongate web **20** spiral wound in a multitude of overlapping layers or laminations.

The web **20** is dispensed from the roll inside the printer illustrated in FIGS. **2** and **3** along a suitable feedpath. The feedpath may include a pair of web guides **22** aligned transversely with each other on opposite sides of the web for guiding the web as it is dispensed through the printer. A platen roller **24** is disposed downstream of the guides and suitably engages the web for pulling the web forward through the printer for dispensing.

Disposed above the platen roller **24** is the printing head **26** which may have any conventional configuration, such as a thermal head assembly for use in direct thermal printing of the web which may be formed of suitable thermal paper. Alternatively, a thermal transfer ribbon ((not shown) may be used with ordinary printing paper for the web.

Disposed at the outlet end of the printer illustrated in FIGS. **2** and **3** is a suitable cutting blade **28** which may have any conventional configuration. In the exemplary embodiment illustrated in these Figures, the cutting blade **28** is rotatably mounted on a roller for suitably cutting the web along a straight line across its full width during operation. In an alternate embodiment, the cutting blade may be stationary, with the user simply tearing or cutting the dispensed label along the blade in a typical manner.

The exemplary printer illustrated in FIG. **3** also includes an index sensor **30** for sensing a suitable index mark contained on the web, if desired. Index sensors are conventional, and

typically are optical components which detect a suitable mark on the web for permitting precise cutting of the individual labels **12** for the intended size. The cutting blade **28** is typically indexed with the platen roller **24** for coordinating the operation thereof. In this way, the distance between the cutting blade and the index sensor **30** is known and permits precise cutting of the web along the longitudinal or running axis **32** thereof during operation.

The label roll **18** in the printer shown in FIGS. **1-3** is illustrated in more particularity in isolation in FIG. **4**. The web **20** is preferably a single ply sheet of suitable label material, such as thermal paper. The web includes a front or top surface **34** which is mounted in the printer illustrated in FIG. **2** facing upwardly for being printed by the printing head **26**. The web also includes an opposite back or bottom surface **36**. The web is wound in the roll **18** in a spiral having a multitude of overlapping layers or laminations in which the back surface **36** is laminated against the front surface **34** of the upstream portions or inner layers of the web.

The back surface **36** illustrated in FIG. **4** includes a plurality of repeating adhesive spots or patches **38** aligned in, and spaced apart along, a column extending along the longitudinal running axis **32** of the web. The adhesive patches **38** may have any conventional composition such as the typical pressure sensitive adhesive which may be formulated for permanent bonding or temporary bonding to the intended surface, such as the package **14** illustrated in FIG. **1**. In the preferred embodiment, the adhesive patches **38** effect weak bonds with the food package **14** to permit the repositioning of the individual labels without tearing of the label upon being removed from a surface.

Instead of providing full surface coverage of the adhesive on the back surface **36** illustrated in FIG. **4**, the adhesive is provided solely in small patches in a relatively minor area of the back surface, with the remaining major area of the back surface being devoid of adhesive. In this way, the substantial reduction in surface area of the adhesive correspondingly decreases the buildup of adhesive inside the printer illustrated in FIG. **2** for increasing the time between any maintenance required therefor.

As further illustrated in FIG. **4**, the front surface **34** of the roll includes a release strip **40** which extends along the running axis directly behind the column of adhesive patches **38**. The release strip may be formed of any suitable releasing material, such as cured silicone or acrylic suitably coating or impregnating the web front surface. In this way, the column of adhesive patches **38** may be laminated to the release strip **40** in the successive layers of the roll illustrated in FIG. **4** without the need for a separate liner. The single ply web wound in the roll **18** is therefore linerless.

Accordingly, when the linerless roll is mounted in the printer illustrated in FIG. **2**, the adhesive-less front surface **34** preferably faces upwardly to engage the web guides **22** and the printing head **26** for preventing adhesive contact therewith. The adhesive back surface **36** faces downwardly and is suitably spaced from adjacent portions of the feedpath for preventing inadvertent bonding therewith. The platen roller **24** is preferably coated with a suitable non-stick material such as polytetrafluoroethylene, typically known by the Teflon trademark brand material.

The non-stick platen roller **24** will therefore suitably drive or pull the web along its feedpath in the printer to permit individual labels **12** to be cut therefrom at the cutting blade **28** disposed immediately downstream from the platen roller. Since the adhesive patches **38** cover a relatively small portion of the area of the back surface **36**, buildup of adhesive on the cutting blade **28** is correspondingly reduced, and limited to the small region aligned with the adhesive patches. Periodic maintenance for removing any adhesive buildup is therefore made easier, or adhesive accumulation may be insignificant within the life of the printer itself.

As shown in FIG. **4**, the adhesive patches **38** are preferably aligned parallel along one lateral edge of the web **20**, and closer thereto than to the opposite lateral edge of the web. In this way, the adhesive is isolated along only one edge of the web, with the remainder of the back surface **36** being devoid of the adhesive.

A particular advantage of the this columnar adhesive configuration is that most of the individual label **12** as illustrated in FIG. **1** is without adhesive and permits ready handling thereof, even by users wearing gloves, with little chance of grabbing the adhesive patch itself. The isolated adhesive patch may then be used for bonding the entire label to the package **14**, in a cantilever fashion for example, for permitting grasping thereof for removal and repositioning of the label if desired.

In the preferred embodiment illustrated in FIGS. **3** and **4** for example, the web **20** is continuous along the running axis, and imperforate without perforations or die cuts. The individual labels **12** may then be defined by the configurations of the adhesive patches **38** and corresponding cutting of the labels by the cutting blade **28** illustrated in FIG. **2**.

In the preferred embodiment illustrated in FIGS. **4** and **5**, the patches **38** are oval, with major axes disposed parallel to the running axis **32**. The patches are identical to each other and repeat along the column thereof. The individual patches have convex leading edges, convex trailing edges, and straight side edges extending therebetween.

A particular advantage of this configuration is the smooth transitioning of the adhesive patches as they travel over the rotating platen roller **24** illustrated in FIG. **3** during operation. The adhesive on the convex leading edge of the patches transitions onto the roller with increasing width, and then leaves the roller with decreasing width for distributing the adhesive forces therebetween during operation.

In the preferred embodiment illustrated in FIGS. **4** and **5**, the web **20** further includes a plurality of repeating index or sensor marks **42** disposed between corresponding ones of the adhesive patches **38** to define corresponding labels **12** each having a single adhesive patch. The index mark **42** may have various configurations, such as the black line which extends across the full width of the web in FIGS. **4** and **5**.

During operation, the index mark **42** illustrated in FIG. **4** is disposed on the web back surface **36** and faces downwardly in FIG. **3** toward the index sensor **30**. As each index mark passes over the index sensor **30** during operation, it is detected thereby. The computer controller of the printer then ensures that the cutting blade **28** is coordinated with the transport of the platen roller **24** for precisely cutting the web longitudinally between successive adhesive patches **38** in this exemplary configuration.

The index marks **42** may be located at any longitudinal position on the web such as between the adjacent adhesive patches, which permits the line marks **42** to provide the top and bottom edges of the individual labels once they have been cut from the web.

FIG. **6** illustrates an alternate embodiment of the label roll in which the adhesive patches **38**B are rectangular instead of oval. In this embodiment, the rectangular patches have straight side edges aligned parallel with the running axis **32**, and are closely adjacent to one edge of the web. The rectangular patches also have straight leading edges and trailing edges extending transversely or perpendicular to the running axis **32** of the web.

The rectangular adhesive patches **38**B illustrated in FIG. **6** are preferably elongate along the running axis **32** and are taller or longer along that axis than they are wide transverse thereto. In this embodiment, the corresponding index marks **42** are also used between the adjacent rectangular patches **38**B to define the corresponding labels **12**, with each label having a single rectangular patch. Like the oval patch **38** illustrated in FIG. **5**, the rectangular patch **38**B is aligned closely along only one edge of the web leaving the majority of the remaining web adhesive-free.

In both embodiments illustrated in FIGS. **5** and **6**, the release strip **40** is the same and covers completely the web front side **34** in full. The silicone release coating of the full area strip **40** protects the underlying printing formed in the thermal paper in the thermal printing process.

FIG. **7** illustrates an alternate embodiment for the release strip, designated **40**B, which is narrow and conforms in width slightly wider than the column of the adhesive patches **38** illustrated in FIG. **5**, or with the column of rectangular patches **38**B illustrated in FIG. **6** if desired. This leaves the remainder of the web front side **34** devoid or free of any release material. This embodiment may be useful for thermal transfer printing in which a transfer ribbon is suitably provided between the printing head and the exposed front surface **34** of the web to the side of the narrow release strip **40**B.

FIG. **8** illustrates yet another embodiment in which rectangular adhesive patches **38**C are elongate transverse to the running axis **32** and are shorter in height along the running axis than they are wide transverse to the running axis. In this way, a column of relatively small rectangular patches may be used instead of the larger rectangular patches **38**B illustrated in FIG. **6**.

The embodiment illustrated in FIG. **8** is preferably devoid of the index marks between the small patches **38**C for permitting variable label size if desired. For example, the web **20** may include a plurality of the labels **12** defined therein, with each label having a plurality of the small adhesive patches **38**C.

The small patches increase the number of adhesive-free spaces between the patches in which the web may be cut for defining the size of the individual labels **12**. Preferably the web is cut in the areas devoid of adhesive to reduce buildup of adhesive on the cutting blade.

In the various embodiments disclosed above, the small adhesive patches reduce the area of adhesive, and correspondingly reduce the associated problems of the adhesive during installation and operation of the linerless label roll in the printer. Reduced area adhesive correspondingly reduces the portions of the printer subject to adhesive buildup. The columnar alignment of the adhesive patches isolates any adhesive buildup to a minor portion of the printer feedpath, and correspondingly reduces the required maintenance therefor.

The train of separated adhesive patches permits cutting of the labels in the adhesive-free spaces for reducing adhesive buildup. And, if individual labels are cut along the adhesive patches themselves, subsequent cutting of labels in the adhesive-free zones provides a form of self-cleaning of the cutting blade.

While there have been described herein what are considered to be preferred and exemplary embodiments of the present invention, other modifications of the invention shall be apparent to those skilled in the art from the teachings herein, and it is, therefore, desired to be secured in the appended claims all such modifications as fall within the true spirit and scope of the invention.

Accordingly, what is desired to be secured by Letters Patent of the United States is the invention as defined and differentiated in the following claims in which we claim:

What is claimed is:

1. A printing label roll comprising:

a web of single-ply thermal printing paper having an exposed front surface and an opposite back surface wound in a roll;

said back surface including a plurality of discrete adhesive patches aligned and spaced apart longitudinally in a single column along a running axis of said web in a minor area of said back surface, with the remaining major area of said back surface being devoid of adhesive; and

said front surface including a release strip extending along said running axis behind said column of adhesive patches, and laminated to said patches in successive layers in said roll.

2. A roll according to claim **1** wherein said patches are aligned along one lateral edge of said web, and closer thereto than to an opposite lateral edge of said web, and said labels extend transversely across said web in cantilever from said adhesive column to permit hand grasping of said adhesive-free major area.

3. A printing label roll comprising:

a web of thermal printing paper having a front printing surface and an opposite back adhesive surface wound longitudinally along a running axis in a roll having a plurality of overlapping layers in which said back surface is laminated against said front surface of inner layers of said web;

said back surface including a plurality of noncontiguous adhesive patches spaced longitudinally apart in a column of adhesive isolated on one side only of the transverse middle of said web in a minor area of said back surface, with the remaining area of said back surface being devoid of adhesive and including adhesive-free spaces transversely bridging said web longitudinally between said adhesive patches to isolate said patches in sequential labels and permit cutting of said web in said adhesive-free spaces to separate said labels; and

said front surface including a release strip extending along said running axis behind said column of adhesive patches, and laminated to said patches in successive layers in said roll, with said patches being sized for bonding an individual label to a surface.

4. A roll according to claim **1** wherein said patches are aligned along one lateral edge of said web, and closer thereto than to an opposite lateral edge of said web, and said labels extend transversely across said web in cantilever from said adhesive column to permit hand grasping of said adhesive-free remaining area.

5. A roll according to claim **4** wherein said web is continuous along said running axis, and imperforate.

6. A roll according to claim **4** wherein said patches have straight edges aligned parallel with said running axis.

7. A roll according to claim **4** wherein said patches have straight edges extending transversely with said running axis.

8. A roll according to claim **4** wherein said patches are rectangular.

9. A roll according to claim **8** wherein said patches are elongate along said running axis.

10. A roll according to claim **9** wherein said web further includes corresponding index marks between adjacent patches to define corresponding labels, each label having a single adhesive patch.

11. A roll according to claim 8 wherein said patches are elongate transverse to said running axis.

12. A roll according to claim 11 wherein said web is devoid of index marks between said patches.

13. A roll according to claim 11 wherein each of said labels has a plurality of said adhesive patches.

14. A roll according to claim 4 wherein said patches have arcuate edges extending transversely with said running axis.

15. A roll according to claim 4 wherein said patches have convex leading edges, convex trailing edges, and straight side edges extending therebetween.

16. A roll according to claim 4 wherein said patches are oval, with major axes disposed parallel to said running axis.

17. A roll according to claim 16 wherein said web further includes corresponding index marks between adjacent patches to define corresponding labels, each label having a single adhesive patch.

18. A roll according to claim 4 wherein said release strip covers said web front side in full.

19. A roll according to claim 4 wherein said release strip is narrow and conforms in width with said column of adhesive patches, leaving the remainder of said web front side devoid thereof.

20. A roll according to claim 4 wherein said release strip comprises silicone coating said web front surface.

21. A method of using said label roll according to claim 4 comprising:

mounting said roll in a printer at an inlet end of a feedpath extending longitudinally to an outlet end terminating in a platen roller, printing head, and cuffing blade transversely bridging said feedpath, with said web being unwound from said roll along said feedpath to said platen roller at said outlet end;

printing indicia atop said web front surface in one of said labels; and

dispensing said printed label from said printer outlet end, with said adhesive patch being disposed laterally at one end of said label, and said adhesive-free remaining area being cantilevered transversely therefrom for being grasped by hand.

22. A label roll for direct thermal printing in sequence individual labels therefrom in a thermal printer having a feedpath extending longitudinally between inlet and outlet ends and terminating at said outlet end in a platen roller, thermal printing head, and cuffing blade transversely bridging said feedpath, said label roll comprising:

an imperforate web of thermal printing paper having a front surface and an opposite back surface wound longitudinally along a running axis in a roll, with said front surface facing outwardly for being printed by said printing head, and said back surface facing inwardly to engage said platen roller for dispensing said web from said roll;

said back surface including a plurality of noncontiguous adhesive patches aligned in and spaced longitudinally apart along a single column of adhesive patches extending along said running axis of said web closer to one lateral edge of said web than to an opposite lateral edge of said web for reducing adhesive surface area exposure along said feedpath and over said platen roller, with adhesive-free spaces transversely bridging said web longitudinally between said adhesive patches to isolate said patches in sequential labels and permit transverse cutting of said web by said blade in said adhesive-free spaces to separate said labels; and

said front surface including a release strip extending along said running axis behind said column of adhesive patches, and laminated to said patches in successive layers in said roll, with said patches being sized for bonding an individual label to a surface.

23. A roll according to claim 22 wherein said patches are oval, with major axes disposed parallel to said running axis.

24. A roll according to claim 23 wherein said web further includes corresponding index marks between adjacent patches to define corresponding labels, each label having a single adhesive patch.

25. A roll according to claim 24 wherein said release strip is narrow and conforms in width with said column of adhesive patches, leaving the remainder of said web front side devoid thereof.

26. A roll according to claim 22 wherein said patches are rectangular.

27. A roll according to claim 26 wherein said patches are elongate along said running axis.

28. A roll according to claim 26 wherein said patches are elongate transverse to said running axis.

29. A roll according to claim 28 wherein each of said labels has a plurality of said adhesive patches.

30. A roll according to claim 22 wherein said printer further includes an index sensor disposed along said feedpath and said web further includes corresponding index marks detectable by said sensor and disposed between adjacent patches to define corresponding labels, each label having a single adhesive patch and a majority adhesive-free portion cantilevered transversely therefrom.

31. A roll according to claim 30 wherein said release strip covers said web front side in full.

32. A label roll according to claim 22 in combination with said thermal printer further comprising:

said roll being mounted in said printer at said inlet end, with said web being unwound from said roll along said feedpath with said front surface facing said printing head and said back surface engaging said platen roller; and

a printed label extends from said printer outlet end, with said printed label having printed indicia thereatop, said adhesive patch being disposed therebelow laterally at one end of said label, and said adhesive-free remaining area being cantilevered transversely therefrom for being grasped by hand.

33. A label roll for direct thermal printing in a thermal printer having a feedpath terminating in a platen roller, thermal printing head, and cutting blade, said label roll comprising:

an imperforate web of thermal printing paper wound longitudinally in a roll;

said web including a train of longitudinally separated identical adhesive patches on one surface facing inwardly to engage said platen roller and a different release strip on an opposite surface behind said train;

said patches being aligned longitudinally in a single narrow column along only one lateral edge of said web to define a sequence of corresponding labels each having a minor adhesive patch isolated inboard in a surrounding adhesive-free remainder of each label;

said adhesive-free remainder transversely bridging said web longitudinally between said patches to permit adhesive-free cutting of said web by said blade to separate said labels; and

said labels extend transversely across said web in cantilever from said narrow Column to permit hand grasping of said adhesive-free remainder.

34. A label roll for printing in sequence individual labels therefrom in a printer including a feedpath extending longi-

tudinally between inlet and outlet ends and terminating at said outlet end in a platen roller, printing head, and cutting blade transversely bridging said feedpath, said label roll comprising:

a web of thermal printing paper having a front surface and an opposite back surface wound longitudinally along a running axis in a roll sized to mount inside said printer at said inlet end, with said front surface facing outwardly for being thermally printed by said printing head, and said back surface facing inwardly to engage said platen roller for dispensing said web from said roll;

said back surface including a plurality of noncontiguous adhesive patches spaced longitudinally apart in a column of adhesive isolated on one side only of the transverse middle of said web in a minor area of said back surface for reducing adhesive surface area exposure along said feedpath and over said platen roller, with the remaining area of said back surface being devoid of adhesive and including adhesive-free spaces transversely bridging said web longitudinally between said adhesive patches to isolate said patches in sequential labels and permit cutting of said web by said blade in said adhesive-free spaces to separate said labels;

said front surface including a release strip extending along said running axis behind said column of adhesive patches, and laminated to said patches in successive layers in said roll, with said patches being sized for bonding an individual label to a surface; and

said patches are aligned longitudinally in a narrow column along one lateral edge of said web, and said labels extend transversely across said web in cantilever from said column to permit hand grasping of said adhesive-free remaining area as said labels are sequentially dispensed from said printer.

35. A roll according to claim **34** wherein said patches are rectangular with straight edges aligned parallel with said running axis, and are longer along said running axis than wide transverse thereto in each of said labels, with a majority of each label being cantilevered therefrom.

36. A roll according to claim **34** wherein said patches are rectangular with straight edges extending transversely with said running axis, and are shorter along said running axis than wide transverse thereto in each of said labels, with a majority of each label being cantilevered therefrom.

37. A roll according to claim **34** wherein said patches are elongate along said running axis to reduce said minor surface area thereof and correspondingly increase said adhesive-free remaining area.

38. A roll according to claim **34** wherein said patches are elongate transverse to said running axis and shorter in height along said running axis than wide transverse thereto to increase the number of patches along said labels.

39. A roll according to claim **34** wherein:

said printer further includes an index sensor disposed along said feedpath; and

said web further includes corresponding index marks between adjacent patches to define corresponding labels, each label having a single adhesive patch and a majority adhesive-free portion cantilevered transversely therefrom.

40. A roll according to claim **34** wherein said web is devoid of index marks between said patches and each label includes a plurality of small adhesive patches isolated along said one side thereof.

41. A roll according to claim **34** wherein said patches have convex leading edges, convex trailing edges, and straight side edges extending therebetween for transitioning onto said platen roller with increasing width and leaving said roller with decreasing width.

42. A roll according to claim **34** wherein said patches are oval, with major axes disposed parallel to said running axis for transitioning onto said platen roller with increasing width and leaving said roller with decreasing width.

43. A roll according to claim **34** wherein;

said web comprises printing paper for use with said printing head; and

said release strip is narrow and conforms in width with said column of adhesive patches, leaving the remainder of said web front side devoid thereof for being printed by said printing head.

44. A label roll for printing in sequence individual labels therefrom in a printer including a feedpath extending longitudinally between inlet and outlet ends and terminating at said outlet end in a platen roller, printing head, and cutting blade transversely bridging said feedpath, said label roll comprising:

a web of label printing material having a front surface and an opposite back surface wound longitudinally along a running axis in a roll sized to mount inside said printer at said inlet end, with said front surface facing outwardly for being printed by said printing head, and said back surface facing inwardly to engage said platen roller for dispensing said web from said roll;

said back surface including a plurality of noncontiguous adhesive patches spaced longitudinally apart in a column of adhesive isolated on one side only of the transverse middle of said web in a minor area of said back surface for reducing adhesive surface area exposure along said feedpath and over said platen roller, with the remaining area of said back surface being devoid of adhesive and including adhesive-free spaces transversely bridging said web longitudinally between said adhesive patches to isolate said patches in sequential labels and permit cutting of said web by said blade in said adhesive-free spaces to separate said labels;

said front surface including a release strip extending along said running axis behind said column of adhesive patches, and laminated to said patches in successive layers in said roll, with said patches being sized for bonding an individual label to a surface;

said patches are aligned longitudinally in a narrow column along one lateral edge of said web, and said labels extend transversely across said web in cantilever from said column to permit hand grasping of said adhesive-free remaining area as said labels are sequentially dispensed from said printer;

said web comprising thermal printing paper; and

said release strip covering said web front side in full to protect underlying print formed in said thermal printing paper by said printing head.

* * * * *

Exhibit B

US007820264B2

(12) **United States Patent**
Blank et al.

(10) **Patent No.: US 7,820,264 B2**
(45) **Date of Patent: Oct. 26, 2010**

(54) **IDLE REGISTERED LABEL ROLL**

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(73) Assignee: **NCR Corporation**, Duluth, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1091 days.

(21) Appl. No.: **11/013,561**

(22) Filed: **Dec. 16, 2004**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
B32B 9/00 (2006.01)
B65D 65/28 (2006.01)
B32B 7/12 (2006.01)

(52) **U.S. Cl.** **428/40.1**; 428/41.8; 428/42.1; 428/43; 428/343; 428/906

(58) **Field of Classification Search** 428/40.1, 428/41.8, 192, 194, 343, 42.1, 43, 906, 195.1, 428/42.2, 42.3; 283/81
See application file for complete search history.

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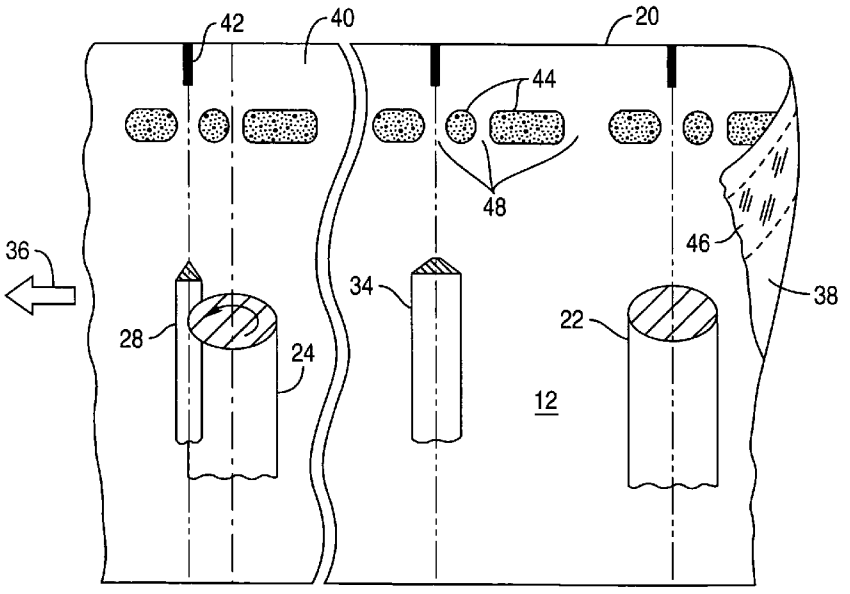
Primary Examiner—Patricia L Nordmeyer

(57) **ABSTRACT**

A linerless label roll includes a web wound along a running axis, and having a series of index marks spaced longitudinally apart. A series of adhesive patches runs along the web, with differently sized adhesive-free zones therebetween in register with the index marks.

27 Claims, 5 Drawing Sheets



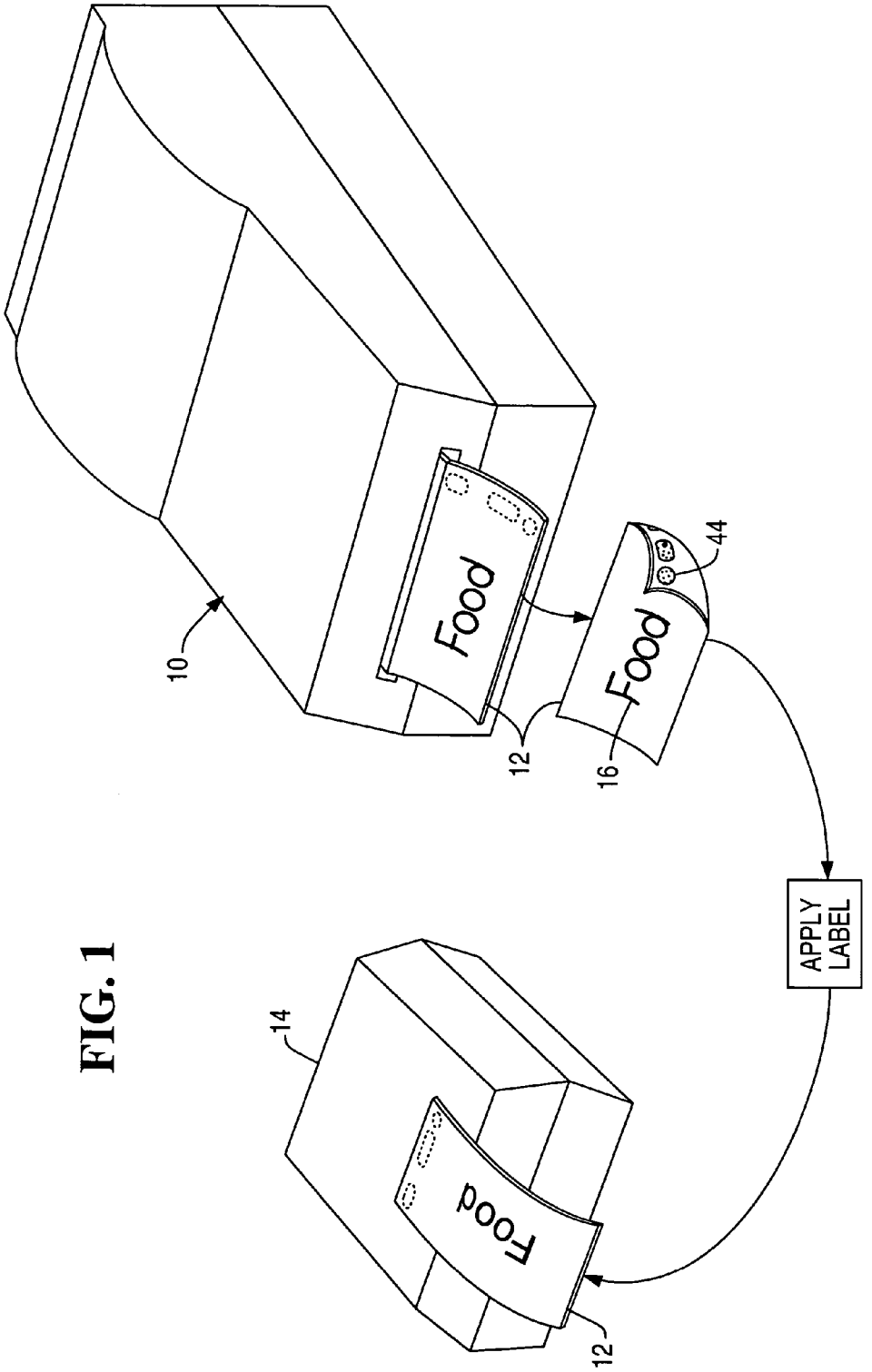


FIG. 1

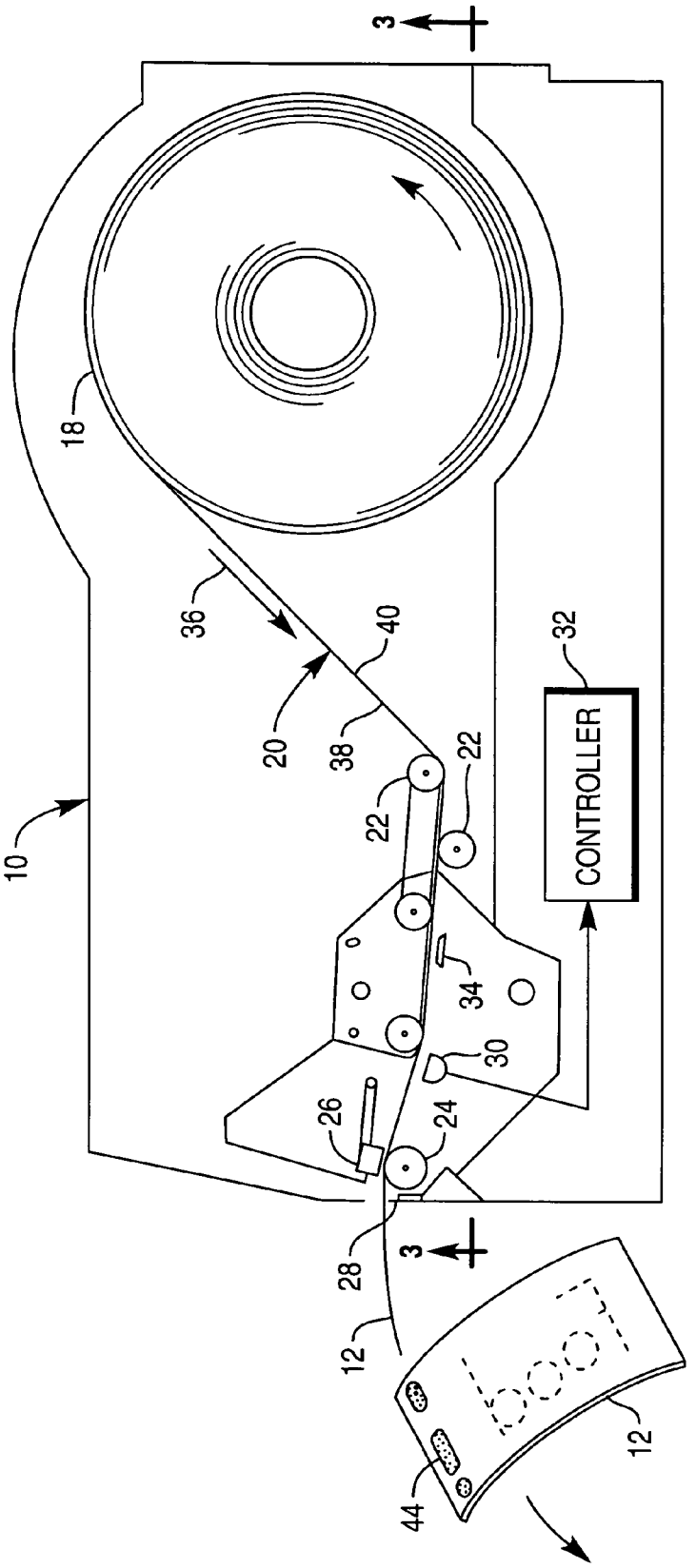

3
18
36
40
20
38
22
22
32
CONTROLLER
10
34
30
26
24
28
3
12
boot
12
44

FIG. 2

FIG. 3

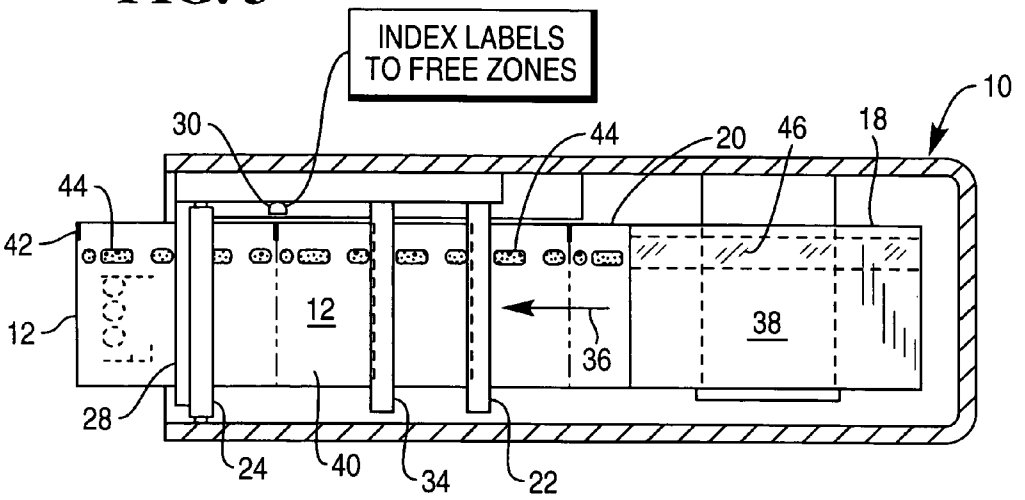

INDEX LABELS TO FREE ZONES
10
30
44
20
46
18
44
42
12
12
38
36
28
24
40
34
22

FIG. 4

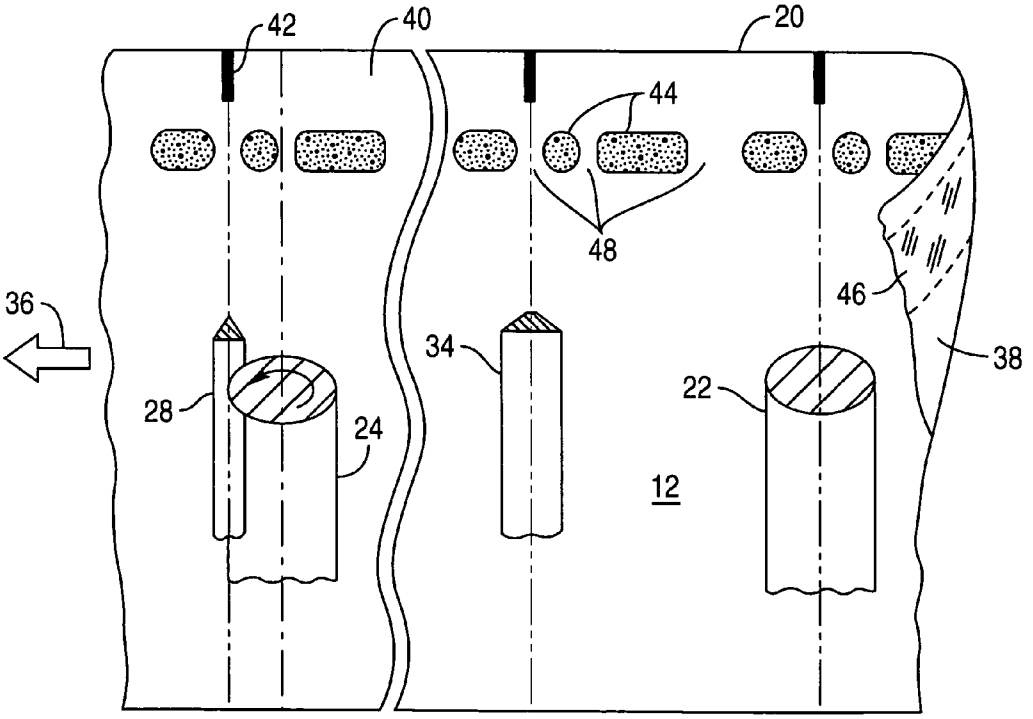

42
40
20
44
48
46
36
38
34
22
28
24
12

FIG. 5

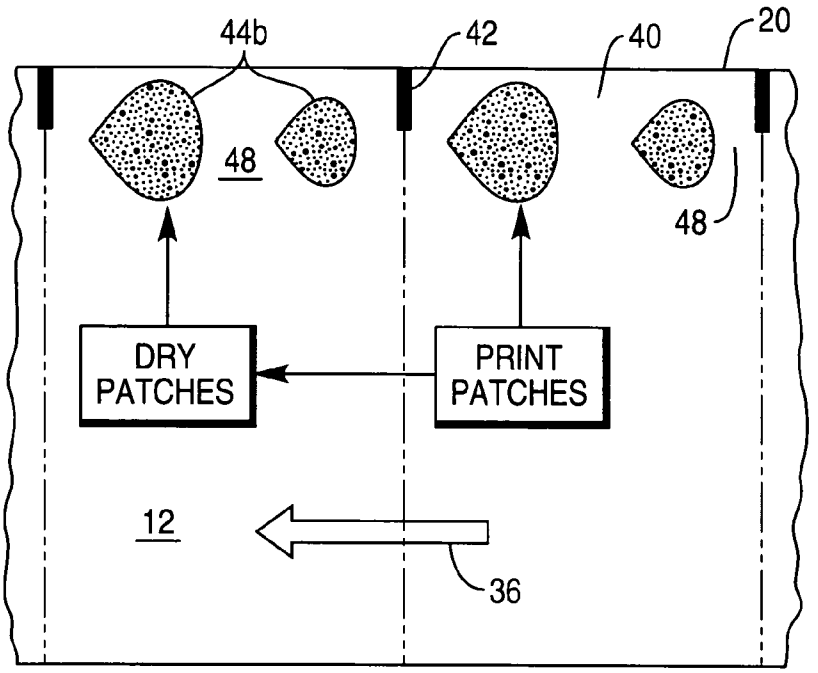

44b
42
40
20
48
48
DRY PATCHES
PRINT PATCHES
12
36

FIG. 6

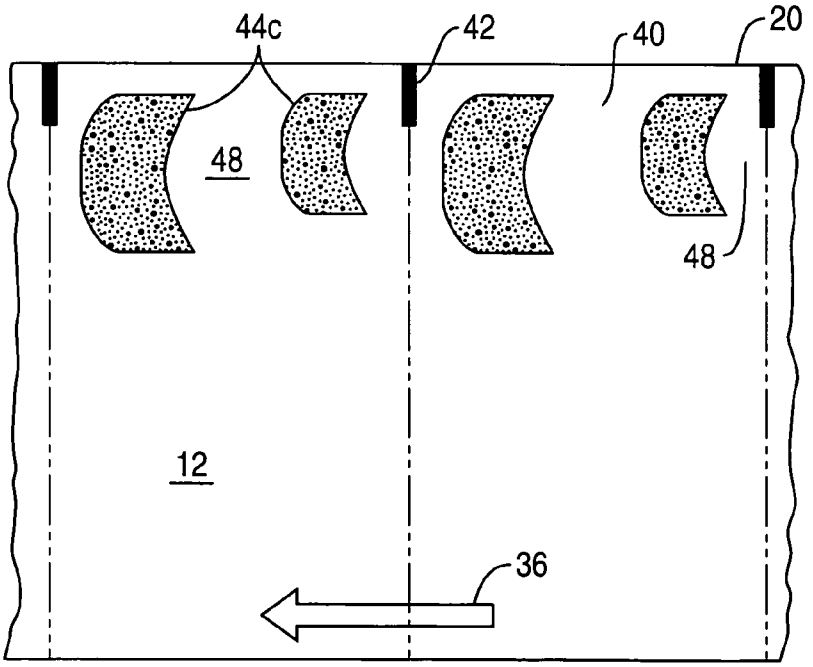

44c
42
40
20
48
48
12
36

FIG. 7

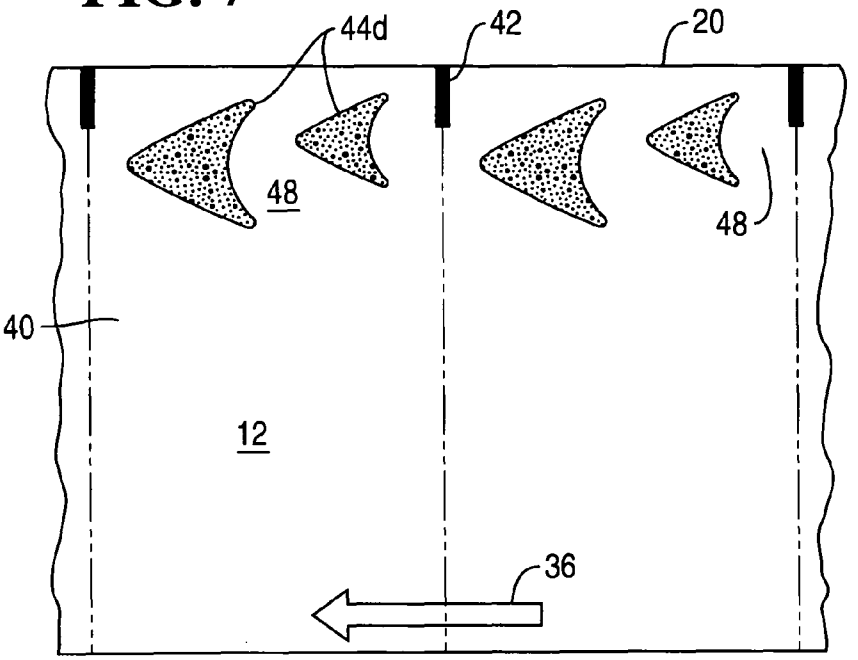
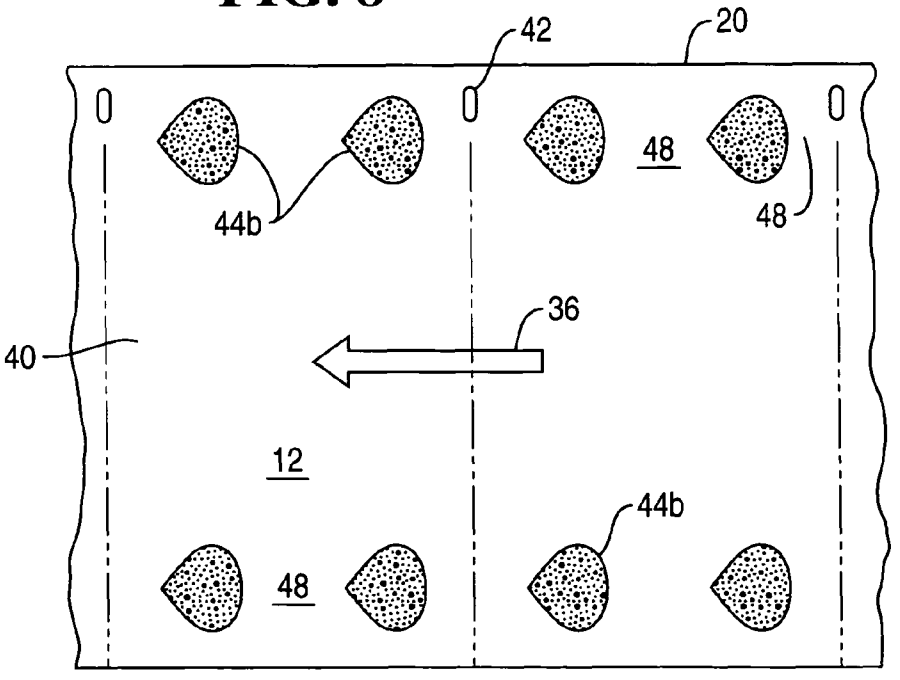


FIG. 8



IDLE REGISTERED LABEL ROLL

BACKGROUND OF THE INVENTION

The present invention relates generally to stationery products, and, more specifically, to adhesive labels.

The ubiquitous adhesive label is available in a myriad of configurations for use in various applications, including specialty applications. The typical adhesive label includes pressure sensitive adhesive on its back side initially laminated to an underlying release liner. The release liner is typically coated with silicone to provide a weak bond with the adhesive for permitting the individual removal of labels from the liner when desired.

Adhesive labels may be found in individual sheets, or joined together in a fan-fold stack, or in a continuous roll. Label rolls are typically used in commercial applications requiring high volume use of labels.

More specifically, in the fast food industry specialty labels may be used in identifying individual food products in typical sales transactions. The label roll may be formed of thermal paper for sequential printing of individual labels in a direct thermal printer. Or, a thermal transfer printer may also be used.

The typical pressure sensitive adhesive label includes full surface adhesive on its back side which may interfere with the handling thereof during the food preparation process. An individual label identifying the corresponding food product is removed from the printer by the user who typically wears sanitary gloves. The label may inadvertently bond to the gloves, and this increases the difficulty of placing the label on the packaging for the intended food product.

Furthermore, the liner material used in the label roll results in waste, and correspondingly affects the cost of the roll. Linerless label rolls are conventionally known in which the front surface of the label web may be coated with a suitable release material, such as silicone, for providing an integrated liner in the web itself without the need for an additional liner sheet.

When the linerless web is unwound in the printer, it extends over a corresponding feedpath having several components over which the adhesive side of the web travels. For example, each printer has a platen or drive roller for driving the web along the feedpath. One or more guide rollers are also found in the printer for guiding the web through the printer and maintaining suitable tension and alignment thereof. And, a tear or cutting bar is also typically found at the outlet end of the printer for permitting individual labels to be severed from the distal end of the web after receiving printing thereon.

Since these exemplary feedpath components are directly exposed to the adhesive on the linerless web, they can accumulate adhesive lost from the web over extended use of the printer. Adhesive buildup on these feedpath components is undesirable since it may restrain free movement of the web during operation and may lead to undesirable jamming of the web in the printer. And, the accumulating adhesive can require periodic cleaning of the feedpath components during routine maintenance operation.

Since every printer has some variation of these feedpath components, all such printers are subject to adhesive buildup when using linerless labels therein. Furthermore, the feedpath components in different printers are typically differently located along the feedpath, and adhesive buildup thereon differently affects performance of the printer.

Accordingly, it is desired to provide an improved linerless label roll for use in a printer having feedpath components exposed to the adhesive on the roll.

BRIEF SUMMARY OF THE INVENTION

A linerless label roll includes a web wound along a running axis, and having a series of index marks spaced longitudinally apart. A series of adhesive patches runs along the web, with differently sized adhesive-free zones therebetween in register with the index marks.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, in accordance with preferred and exemplary embodiments, together with further objects and advantages thereof, is more particularly described in the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. **1** is an isometric view of a thermal printer dispensing pressure sensitive labels in an exemplary application.

FIG. **2** is a side elevational internal view of the printer shown in FIG. **1** illustrating exemplary components along the feedpath of the label roll mounted therein.

FIG. **3** is a bottom view inside the printer illustrated in FIG. **2** and taken along line **3**-**3**.

FIG. **4** is a plan view of a portion of the exemplary linerless label web illustrated in FIG. **3**.

FIG. **5** is a plan view of a portion of the linerless web in accordance with another embodiment.

FIG. **6** is a plan view of a portion of the linerless web in accordance with another embodiment.

FIG. **7** is a plan view of a portion of the linerless web in accordance with another embodiment.

FIG. **8** is a plan view of a portion of the linerless web in accordance with another embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Illustrated in FIG. **1** is a conventional printer **10** configured for printing in sequence individual labels **12** for use in an exemplary fast food application. For example, food may be placed in a suitable food package **14** such as the paper box illustrated, or simple wrapping paper (not illustrated).

Print or identifying indicia **16** is printed on the label in the printer for identifying the contents of the package, for example. The individual printed label may then be removed from the printer and applied to the food package **14** as illustrated in the exemplary method shown in FIG. **1**.

FIG. **2** illustrates certain elements along the feedpath of the printer **10**, which may otherwise have any conventional configuration, such as a direct thermal printer, or alternatively a thermal transfer printer. A label roll **18** is suitably mounted inside the printer either in a tray therefor, or on a support spindle extending through the center core thereof. The roll includes a continuous, elongate web **20** spiral wound in a multitude of overlapping layers or laminations.

The web **20** is dispensed from the roll inside the printer illustrated in FIGS. **2** and **3** along a suitable feedpath. The feedpath may include a series of guide rollers **22** supported on opposite sides of the web for guiding the web as it is dispensed through the printer. A platen or drive roller **24** is disposed downstream of the guides and suitably engages the web for pulling the web forward through the printer for dispensing.

Disposed above the platen roller **24** is the printing head **26** which may have any conventional configuration, such as a thermal head assembly for use in direct thermal printing of the web which may be formed of suitable thermal paper. Alternatively, a thermal transfer ribbon ((not shown) may be used with ordinary printing paper for the web.

Disposed at the outlet end of the printer is a suitable tear bar **28** suitably supported for allowing the user to simply tear or cut the dispensed label from the distal end of the web in a typical manner. Various forms of label cutting or tearing devices are conventional and may be used in the printer. For example, a rotary cutting blade may be suitably mounted for automatically cutting the presented label following printing thereof.

The exemplary printer illustrated in FIG. **2** also includes an index sensor **30** for sensing a suitable index mark contained on the web. The index sensor is operatively joined to a computer controller **32** of the printer, which in turn controls all operating functions of the printer.

Index sensors are conventional, and typically include optical components which detect a suitable mark on the web for permitting precise indexing and tearing of the individual labels **12** for the intended size. Each printed label is typically indexed with the platen roller **24** for coordinating the operation thereof.

In this way, the index mark for an upstream label on the web is detected by the sensor to coordinate rotation of the platen roller **24** to accurately dispense the downstream label **12** from the outlet end of the printer. The index marks provided on the web ensure the accurate placement of the inter-label edge of the presented label along the tear bar **28** so that a complete label can be severed from the web by the user after printing of the label.

In the exemplary embodiment illustrated in FIGS. **2** and **3**, the printer also includes a snap bar **34** located on the platen side of the web which permits the optional use of the printer for direct thermal printing or thermal transfer printing with a corresponding thermal transfer ribbon (not shown).

Accordingly, the feedpath of the exemplary printer illustrated in FIGS. **2** and **3** includes a plurality of longitudinally spaced apart components **22**,**24**,**28**,**34** over which the web travels during operation. The web is unwound from the roll in the longitudinal direction along the running axis **36** of the web to reach the printing head **26**, followed in turn by dispensing individual labels in series from the printer.

The exemplary label roll **18** is illustrated installed in the printer in FIG. **3**, with an enlarged portion thereof being illustrated in FIG. **4**. The web **20** is preferably a single ply sheet of suitable label material, such as thermal paper. The web includes a front or top surface **38** which is mounted in the printer illustrated in FIG. **2** facing upwardly for being printed by the printing head **26**.

The web also includes an opposite back or bottom surface **40**. The web is wound in the roll **18** in a spiral having a multitude of overlapping layers or laminations in which the back surface **40** is laminated against the front surface **38** of the upstream portions or inner layers of the web.

The web illustrated in FIGS. **3** and **4** includes a plurality of repeating index sensor marks **42** arranged in a series along the running axis **36** of the web and longitudinally spaced apart from each other. The index marks may have any conventional configuration such as the short black marks illustrated, and are suitably detected by the corresponding index sensor **30** in an exemplary optical form.

Any type of index mark and sensor known in the prior art may be used for indexing motion of the series of labels **12** as they are driven along the web running axis during operation. The index marks **42** are disposed on the back surface **40** of the web in the exemplary embodiment illustrated, but could also be disposed on the front surface, or may even be in the form of gaps or holes through the web detectable from either side of the web.

In the exemplary embodiment illustrated in FIGS. **3** and **4**, the index marks **42** define the side or inter-label edges of the individual labels **12** and permit the individual labels to be torn accurately from the distal end of the web at the tear bar **28**. The controller **32** illustrated in FIG. **2** is configured to drive the platen roller **24** to index successive labels in turn with the corresponding index mark being aligned atop the tear bar for example. An individual label may then be torn from the web for accurately controlling the size of the individual labels.

The back surface **40** illustrated in FIG. **4** includes a plurality of repeating adhesive spots or patches **44** aligned in, and spaced apart along, a column extending along the longitudinal running axis **36** of the web. The adhesive patches **44** may have any conventional composition such as the typical pressure sensitive adhesive which may be formulated for permanent bonding or temporary bonding to the intended surface, such as the package **14** illustrated in FIG. **1**. In the preferred embodiment, the adhesive patches **44** effect weak bonds with the food package **14** to permit the repositioning of the individual labels without tearing of the label upon being removed from a surface.

Instead of providing full surface coverage of the adhesive on the back surface **40** illustrated in FIG. **4**, the adhesive is provided solely in small patches in a relatively minor area of the back surface, with the remaining major area of the back surface being devoid of adhesive. In this way, the substantial reduction in surface area of the adhesive correspondingly decreases the buildup of adhesive inside the printer illustrated in FIG. **2** for increasing the time between any maintenance required therefor.

As further illustrated in FIG. **4**, the front surface **38** of the roll includes a release strip **46** which extends along the running axis directly behind the column of adhesive patches **44**. The release strip may be formed of any suitable releasing material, such as cured silicone or acrylic suitably coating or impregnating the web front surface. The release strip may extend across the full width of the web, or only a portion thereof as desired.

In this way, the column of adhesive patches **44** may be laminated to the release strip **46** in the successive layers of the roll illustrated in FIG. **4** without the need for a separate liner. The single ply web wound in the roll **18** is therefore linerless.

Accordingly, when the linerless roll is mounted in the printer illustrated in FIG. **2**, the adhesive-less front surface **38** preferably faces upwardly to engage some of the guide rollers and the printing head **26** for preventing adhesive contact therewith. The adhesive back surface **40** faces downwardly and is suitably spaced from adjacent portions of the feedpath for preventing inadvertent bonding therewith.

However, some of the feedpath components will engage the web adhesive during travel. The platen roller **24**, for example, is therefore preferably coated with a suitable non-stick material such as polytetrafluoroethylene, typically known by the Teflon trademark brand material to reduce adhesion with the adhesive.

The non-stick platen roller **24** will therefore suitably drive or pull the web along its feedpath in the printer to permit individual labels **12** to be cut therefrom at the tear bar **28** disposed immediately downstream from the platen roller. The exposed adhesive on the web will also travel over the lower guide roller **22** and snap bar **34**.

Since the adhesive patches **44** cover a relatively small portion of the area of the back surface **40**, buildup of adhesive on the various printer components is correspondingly reduced, and is limited to the small region aligned with the adhesive patches. Periodic maintenance for removing any

adhesive buildup is therefore made easier, or adhesive accumulation may be insignificant within the life of the printer itself.

As shown in FIG. **4**, the adhesive patches **44** are preferably aligned parallel along one lateral edge of the web **20**, and closer thereto than to the opposite lateral edge of the web. In this way, the adhesive is isolated along only one edge of the web, with the remainder of the back surface **40** being devoid of the adhesive.

A particular advantage of the this columnar adhesive configuration is that most of the individual label **12** as illustrated in FIG. **1** is without adhesive and permits ready handling thereof, even by users wearing gloves, with little chance of grabbing the adhesive patch itself. The isolated adhesive patch may then be used for bonding the entire label to the package **14**, in a cantilever fashion for example, for permitting grasping thereof for removal and repositioning of the label if desired.

As shown in FIG. **4**, the longitudinal series of index marks **42** are in turn used to define the longitudinal series of individual labels **12** being configured along the running axis of the web **20**. As indicated above, a majority of the back surface of each label **12** is preferably devoid of adhesive, with the adhesive running along one edge of the label in the series of adhesive patches **44**.

Correspondingly, the individual adhesive patches **44** in the common column are longitudinally separated from each other by corresponding adhesive-free zones **48**. The longitudinal spacing between the adhesive patches which defines the longitudinal length of the corresponding free zones **48** is preferably different in each of the labels relative to or in register with the corresponding index marks **42** which are used to define the individual labels.

In the exemplary embodiment illustrated in FIG. **4**, the adhesive patches **44** also have different sizes or longitudinal lengths along the running axis **36** of the web relative to or in register with the corresponding index marks **42**. In this way, both the adhesive patches and the intervening adhesive free zones may be predeterminedly located on the individual labels to correspond with their subsequent travel inside the printer illustrated in FIGS. **2** and **3**.

More specifically, and as indicated above, the exemplary printer feedpath illustrated in FIGS. **2** and **3** includes several longitudinally spaced apart components, such as **22**,**24**,**28** and **34** over which the web back surface **40** travels or touches during operation. The adhesive-free front side or surface **38** of the web faces upwardly towards the printing head **26** and is retained by various top guides in the printer, whereas the back side or surface **40** of the web faces downwardly and engages the additional feedpath components therebelow as the web travels downstream through the printer and is dispensed from the initial roll **18**.

During dispensing operation, the small patches of adhesive will slide past the feedpath components in engagement therewith and are subject to relatively small adhesive buildup over the life of the printer.

However, when the printer is idle temporarily between printing individual labels, or for longer periods of inactivity, it is undesirable to have the adhesive patches remain in contact with any of the feedpath components for any extended period of time during which the adhesive bond therewith might be allowed to strengthen and result in additional buildup of adhesive on the feedpath components. This adhesive contact may also lead to printer jams.

Accordingly, the adhesive-free zones **48** illustrated in FIG. **4** are predeterminedly located on the web **20** to correspond in longitudinal spacing with the longitudinal spacing of the various feedpath components, such as the guide roller **22**, platen roller **24**, tear bar **28**, and snap bar **34**, so that during idle use of the printer, the free zones are temporarily aligned with these components and prevent adhesive contact therewith. Correspondingly, the series of adhesive patches **44** are distributed between the various feedpath components during idle operation and are suspended remotely therefrom without contact therewith.

Accordingly, in a method of operating the printer illustrated in FIGS. **1** and **2**, the label roll is initially installed in the printer, with the web **20** being fed along the longitudinal feedpath defined by the various feedpath components. Individual labels **12** as illustrated in FIG. **1** may be printed in series along the web and dispensed from the printer one by one in turn for their intended use.

As shown in FIGS. **3** and **4**, the index sensor **30** is used for detecting the series of index marks **42** in turn as the web is driven through the printer. The controller **32** is then operated to ensure that successive label edges defined by the corresponding index marks are accurately positioned along the tear bar **28** for each label in turn.

Correspondingly, the adhesive free zones **48** on the web are also positioned in alignment or register with the corresponding feedpath components during idling operation and therefore prevent resting of the adhesive patches on the feedpath components.

FIGS. **3** and **4** illustrate that when the dispensed label **12** is located with its trailing edge index mark **42** aligned atop the tear bar **28**, corresponding upstream free zones **48** are aligned with the guide roller **22**, platen roller **24**, and snap bar **34**. In this idle position of the web between successive printing of the adjacent labels, the corresponding free zones **48** are specifically positioned to correspond with any and preferably all feedpath components which might otherwise be in contact with the adhesive patches.

Accordingly, each label roll **18** is custom designed for a specific label printer and the specific location of the various feedpath components therein over which the adhesive travels during operation. By preferentially locating the adhesive free zones **48** in each embodiment of the label for a corresponding printer design, adhesive-free contact between the linerless label and the feedpath components may be obtained during idle operation of the printer, and thereby further reduce the opportunity for adhesive buildup during the life of the printer and for printer jams.

In the exemplary embodiment illustrated in FIG. **4**, the adhesive free zones **48** are sized and located along the column of adhesive patches to match the corresponding longitudinal spacing of the various feedpath components found in the associated printer over which the adhesive will travel during operation. The size or length of the free zones **48** are selected within suitable manufacturing and operational tolerances to prevent contact of the adjacent adhesive with the feedpath components during idle operation.

Correspondingly, the series of adhesive patches **44** in each label **12** have different lengths to maximize the collective surface area of the adhesive patches in each of the labels, which adhesive is interrupted by the adhesive-free zones therebetween.

The exemplary forms of the adhesive patches **44** illustrated in FIG. **4** have different sizes or surface area in each of the labels, and also have different configurations as defined by their size, area, width, or profile.

The adhesive patches **44** preferably vary in lateral width between the leading and trailing edges thereof, and along the running axis **36** of the web. For example, each patch **44** preferably diverges in width aft from the leading edge thereof

along the running axis, and also converges in width aft to the trailing edge along the running axis.

The leading and trailing edges of the adhesive patches **44** illustrated in FIG. **4** are preferably arcuate and generally nonlinear for both performance and manufacturing advantages. For example, each of the labels **12** includes a corresponding circular adhesive patch followed in turn by two oblong patches of different lengths. The circular patches have convex leading and trailing edges. The oblong patches may have convex leading and trailing edges, or convex edges with short straight sections therebetween.

The circular and oblong patches **44** illustrated in FIG. **4** alternate along the running axis in the series of labels **12** and repeat in pattern identically from label to label. In this way, the amount of adhesive in the limited column provided for the adhesive patches may be maximized along the running axis of the web, while minimizing the longitudinal length of the adhesive free zones **48** therebetween. The free zones may be used to advantage as discussed above to ensure alignment thereof with corresponding feedpath components found in the intended printer over which the adhesive patches travel during dispensing of the labels, with the free zones being aligned therewith during idle operation.

The platen roller **24** illustrated in FIG. **4** is driven during operation to pull the web through the printer for dispensing labels in turn. The column of adhesive patches **44** therefore not only travels transversely over the platen roller **24** but also over the other feedpath components such as the guide roller **22**, tear bar **28**, and snap bar **34**.

The varying width of the leading and trailing edges of the adhesive patches therefore gradually transitions the adhesive patches with these feedpath components as the leading edges are carried thereover, and correspondingly gradually transitions the trailing edges of the patches as they leave these components during travel. This feature may be used to advantage for decreasing adhesive buildup during operation of the printer over its intended life.

FIG. **5** illustrates another embodiment of the linerless web **20** in which the adhesive patches, designated **44***b*, have a different, ovate configuration in the general form of a teardrop. The ovate patches **44***b* have narrow or relatively sharp leading edges and spread in width, which becomes maximum before converging to the trailing edges thereof. Since the leading and trailing edges vary in width along the running axis, the ovate adhesive patches enjoy the operational advantages described above.

In addition, the ovate patches enjoy advantages during manufacture. FIG. **5** illustrates schematically that the series of ovate patches may be formed during manufacturing by printing the desired adhesive patches on the web in a column along one edge thereof. The running axis **36** illustrated in FIG. **5** is also the running axis of the web during the printing operation which permits the individual patches to be suitably cured or dried as each patch is printed at an upstream location.

Testing of this design has shown that the thickness of the applied adhesive may be made more uniform due to the varying width of the patch, and this prevents excessive buildup or thickness of the adhesive near the trailing edge of the patches. Excessive adhesive buildup is undesirable because it increases the time required for drying the adhesive, and excessive adhesive may not fully dry during the manufacturing process and can later lead to liberation of the excessive adhesive inside the printer leading to undesirable adhesive buildup in the various components thereof.

Correspondingly, the varying width configuration of the adhesive patches illustrated in FIG. **5** therefore permits a wider range of process speeds with improved adhesive drying capability resulting in a final product with a more consistent adhesive coating weight. In view of the improved uniformity of the adhesive patch, additional adhesive coat weight or thickness may be obtained without unacceptably long drying times, or subsequent adhesive shedding in the printer.

In the exemplary embodiment illustrated in FIG. **5**, the ovate patches **44***b* may alternate in large and small size along the running axis **36** which can be used for tailoring the adhesive performance thereof while also tailoring the length of the intervening adhesive-free zones **48** therebetween. Although two ovate patches **44***b* are illustrated in FIG. **5**, three or more of such patches may be used in manner similar to the embodiment illustrated in FIG. **4**.

As indicated above, the number, size, and spacing of the adhesive patches and the corresponding adhesive-free zones **48** therebetween are controlled in large part by the configuration of the intended printer and the size and location of the corresponding feedpath components therein. Each printer typically has some form of platen roller, some form of tear bar or cutter, and some form of guide roller subject to adhesive buildup from the linerless label roll. The number of adhesive patches and intervening adhesive-free zones is therefore tailored to the specific embodiment of the intended printer.

FIG. **6** illustrates yet another embodiment of the adhesive patches in the form of chevron patches designated **44***c*, which alternate in large and small sizes along the running axis **36** in the exemplary embodiment illustrated.

The chevron patches **44***c* have arcuate or nonlinear leading and trailing edges, with the leading edge thereof having a relatively wide convex contour, and the trailing edges thereof having similarly wide concave profiles. Testing of the chevron patch design supports the additional manufacturing and performance benefits described above for the previous embodiments.

FIG. **7** illustrates yet another embodiment of the adhesive patches in the exemplary form of arrowhead patches **44***d*. The arrowhead patches similarly alternate in large and small size along the running axis **36** in the same manner as the above embodiments.

The arrowhead patches **44***d* have relatively narrow or sharp leading edges and spread in width to relatively wide concave trailing edges terminating in two points. Testing of this design also confirms the advantages in performance and manufacture as described above.

The various forms of adhesive patches described above may be aligned along only one edge of the corresponding webs **20** closer thereto than to the opposite edge of the web. The collective surface area of the column of adhesive patches in these various embodiments correspond with a minor area of the full back surface of each label, with a major area of the back surface being devoid of adhesive.

FIG. **8** illustrates yet another embodiment in which the ovate adhesive patches **44***b*, for example, are disposed in two columns along opposite edges of the same web **20**. The use of columns of the adhesive patches reduces the likelihood of adhesive buildup over the life of the printer, and although one column of adhesive patches is preferred, two or more columns may be used if desired.

FIG. **8** also illustrates an alternate form of the index mark **42** which may be a simple aperture or gap through the web optically detected in any conventional manner. As indicated above, various forms of index marks may be used for optical or magnetic, or in any other conventional form of detection.

While there have been described herein what are considered to be preferred and exemplary embodiments of the present invention, other modifications of the invention shall be apparent to those skilled in the art from the teachings

herein, and it is, therefore, desired to be secured in the appended claims all such modifications as fall within the true spirit and scope of the invention.

Accordingly, what is desired to be secured by Letters Patent of the United States is the invention as defined and differentiated in the following claims in which we claim:

The invention claimed is:

1. A label roll comprising:

a web wound in said roll along a running axis, and

an identically repeating series of differently sized adhesive patches and differently sized adhesive free zones therebetween aligned in a column along said web.

2. A roll according to claim **1** wherein said adhesive patches vary in width between leading and trailing edges thereof along said running axis.

3. A roll according to claim **2** wherein said leading and trailing edges of said adhesive patches are arcuate.

4. A roll according to claim **1** wherein said web further comprises a series of index marks spaced apart longitudinally therealong.

5. A roll according to claim **4** wherein:

said web includes one side containing said adhesive patches and free zones, and an opposite side containing a release strip aligned therewith to form a series of linerless labels defined between said index marks; and

said free zones are predeterminedly located on said web in each of said labels in register with said index marks.

6. A label roll for use in a printer comprising:

a web having a front surface and an opposite back surface wound in a roll, and including a plurality of index marks spaced apart longitudinally along a running axis of said web to define a series of labels;

said back surface including an identically repeating series of adhesive patches aligned in a column along said running axis and separated from each other by adhesive free zones having different lengths in each of said labels in register with said index marks to prevent adhesive contact during idle interruption in travel of said web through said printer, wherein said adhesive patches have different lengths along said running axis in register with said index marks; and

said front surface including a release strip extending along said running axis behind said column of adhesive patches, and laminated to said patches in successive layers in said roll.

7. A roll according to claim **6** wherein:

said printer includes a feedpath with a plurality of longitudinally spaced apart components over which said web back surface travels during operation; and

said free zones are predeterminedly located on said web to correspond in longitudinal spacing with said longitudinal spacing of said feedpath components.

8. A method of using said label roll according to claim **7** comprising:

installing said roll in said printer, with said web being fed along said feedpath;

printing individual labels in series along said web; and

detecting said index marks and indexing said web to position said adhesive free zones in register with said feedpath components during idling between printing said labels.

9. A roll according to claim **6** wherein said adhesive patches have different lengths in each of said labels.

10. A roll according to claim **6** wherein said adhesive patches have different sizes in each of said labels.

11. A roll according to claim **6** wherein said adhesive patches have different configurations in each of said labels.

12. A roll according to claim **6** wherein each of said adhesive patches diverges aft from a leading edge thereof along said running axis.

13. A roll according to claim **12** wherein each of said adhesive patches converges aft to a trailing edge thereof along said running axis.

14. A roll according to claim **13** wherein said adhesive patches comprise circular patches.

15. A roll according to claim **13** wherein said adhesive patches comprise oblong patches.

16. A roll according to claim **13** wherein said adhesive patches comprise alternating circular and oblong patches.

17. A roll according to claim **13** wherein said adhesive patches comprise ovate patches.

18. A roll according to claim **17** wherein said ovate patches alternate in large and small size along said running axis.

19. A roll according to claim **17** wherein said ovate patches have narrow leading edges and spread in width toward the trailing edges thereof.

20. A roll according to claim **13** wherein said adhesive patches comprise chevron patches.

21. A roll according to claim **20** wherein said chevron patches have wide convex leading edges, and concave trailing edges.

22. A roll according to claim **20** wherein said chevron patches alternate in large and small size along said running axis.

23. A roll according to claim **13** wherein said adhesive patches are shaped like arrowheads.

24. A roll according to claim **23** wherein said arrowhead patches have narrow leading edges and spread in width to concave trailing edges.

25. A roll according to claim **23** wherein said arrowhead patches alternate in large and small size along said running axis.

26. A roll according to claim **1** wherein said patches are aligned along one edge of said web in a minor area of said back surface, with a major area of said back surface being devoid of adhesive.

27. A roll according to claim **26** wherein said adhesive patches are disposed in two columns along opposite edges of said web.

* * * * *

Exhibit C

US008537184B2

(12) **United States Patent**
Roth et al.

(10) **Patent No.: US 8,537,184 B2**
(45) **Date of Patent: Sep. 17, 2013**

(54) **LINERLESS LABELS**

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(73) Assignee: **NCR Corporation**, Duluth, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 553 days.

(21) Appl. No.: **12/712,380**

(22) Filed: **Feb. 25, 2010**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
B41J 2/325 (2006.01)

(52) **U.S. Cl.**
USPC **347/171**

(58) **Field of Classification Search**
USPC 347/171, 172–173, 175–176, 221; 400/82, 188, 120.01–120.04, 120.05; 368/327; 156/152
See application file for complete search history.

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2007/0211135	A1 *	9/2007	Moreland et al.	347/221

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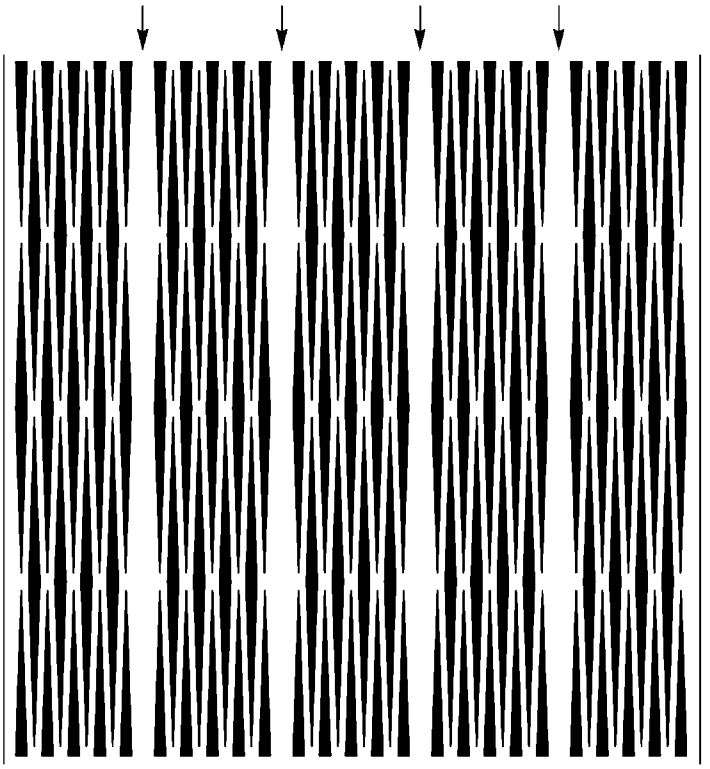
Primary Examiner — Kristal Feggins
(74) *Attorney, Agent, or Firm* — Charles Q. Maney; Paul W. Martin

(57) **ABSTRACT**

Linerless labels are presented. A label includes a specific pattern or set of patterns of adhesive applied to one side of the label. The adhesive pattern(s) reduces contact between a cutter blade of a printer and the adhesive on the one side of the label. Moreover, the adhesive patterns reduce buildup of adhesive on the cutter blade and reduce buildup at specific locations on the cutter blade. That is, the adhesive patterns more evenly distribute adhesive buildup across the cutter blade. Consequently, the cutter blade can be used for a longer period of time before the cutter blade needs to be cleaned of the adhesive.

20 Claims, 11 Drawing Sheets



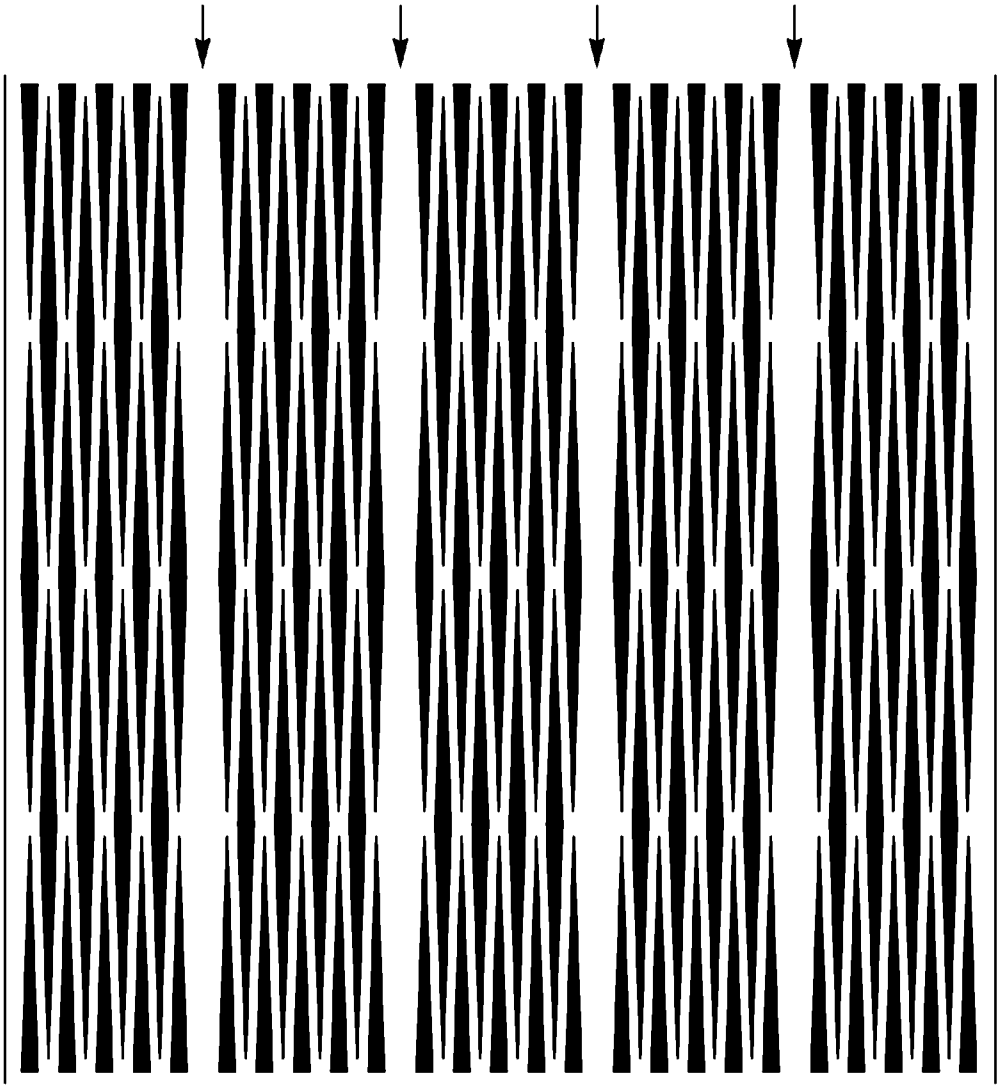


FIG. 1A

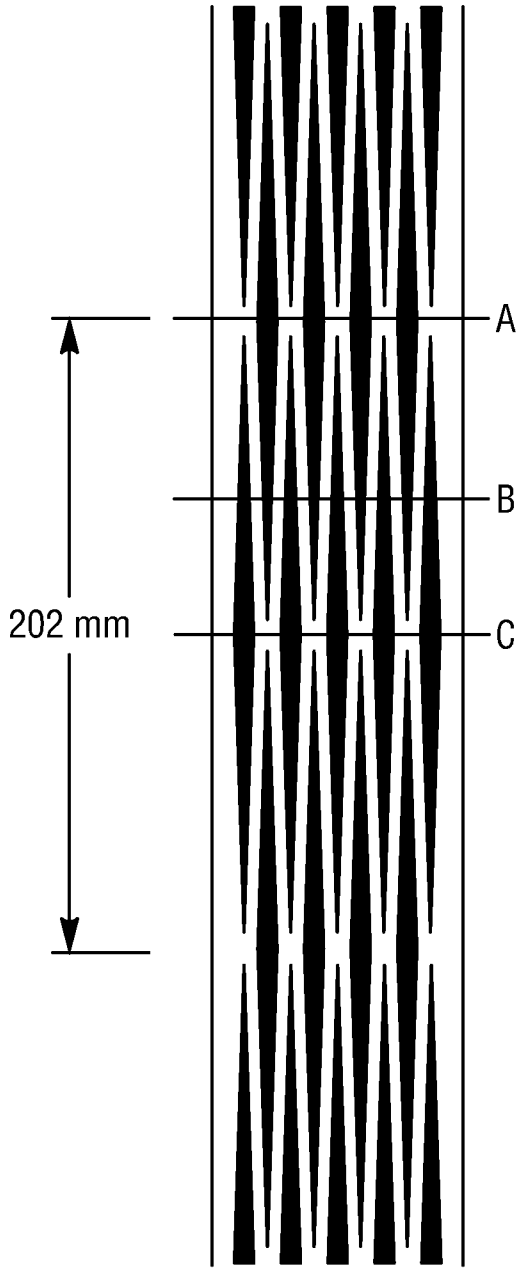


FIG. 1B

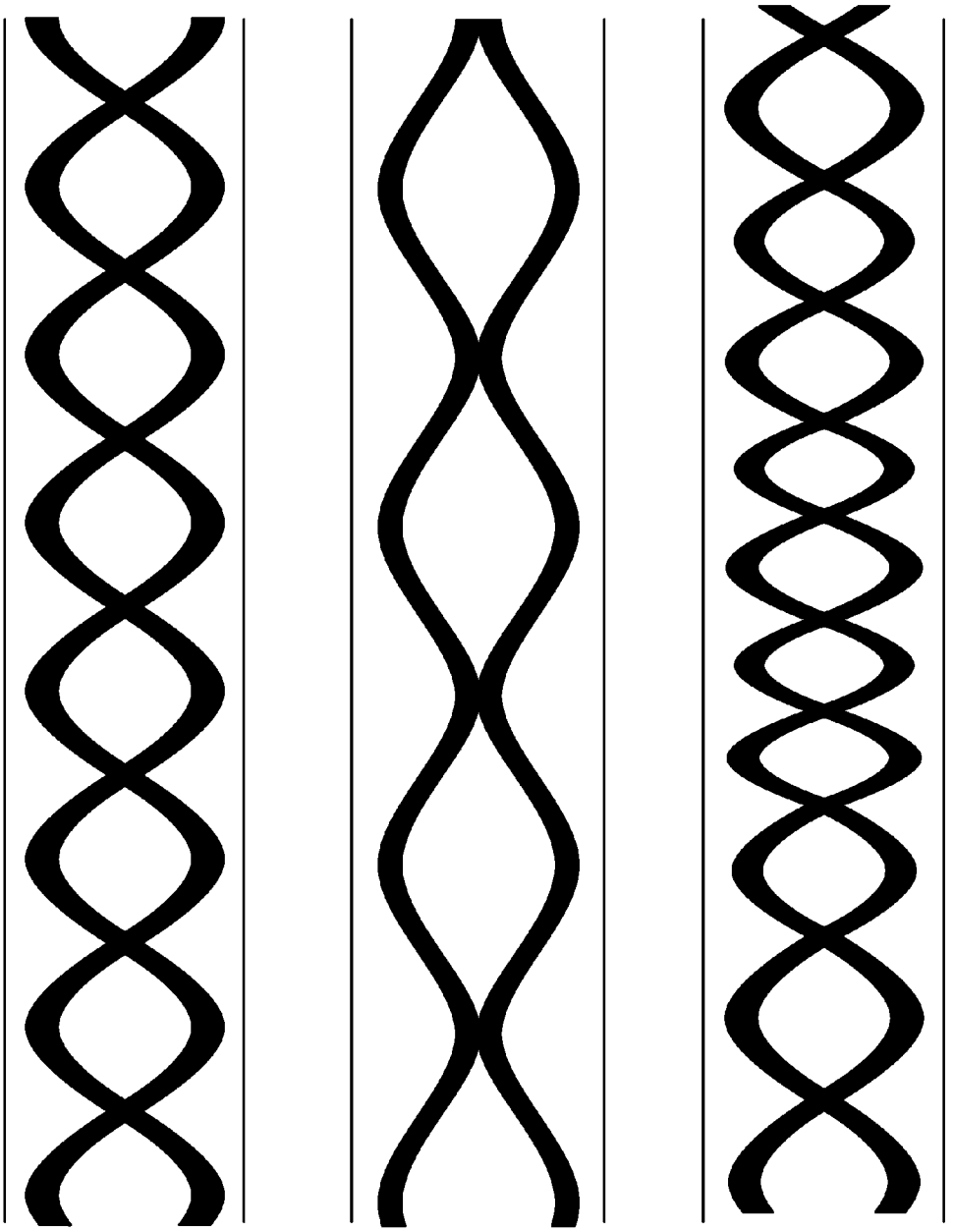


FIG. 1C

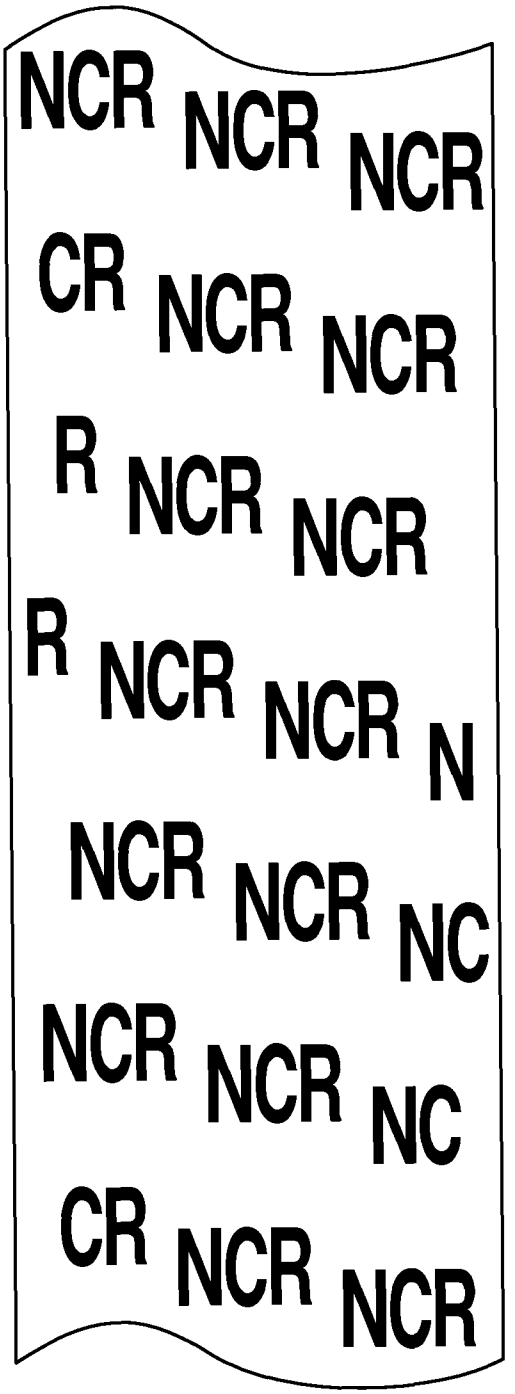

NCR NCR NCR
CR NCR NCR
R NCR NCR
R NCR NCR N
NCR NCR NC
NCR NCR NC
CR NCR NCR

FIG. 1D

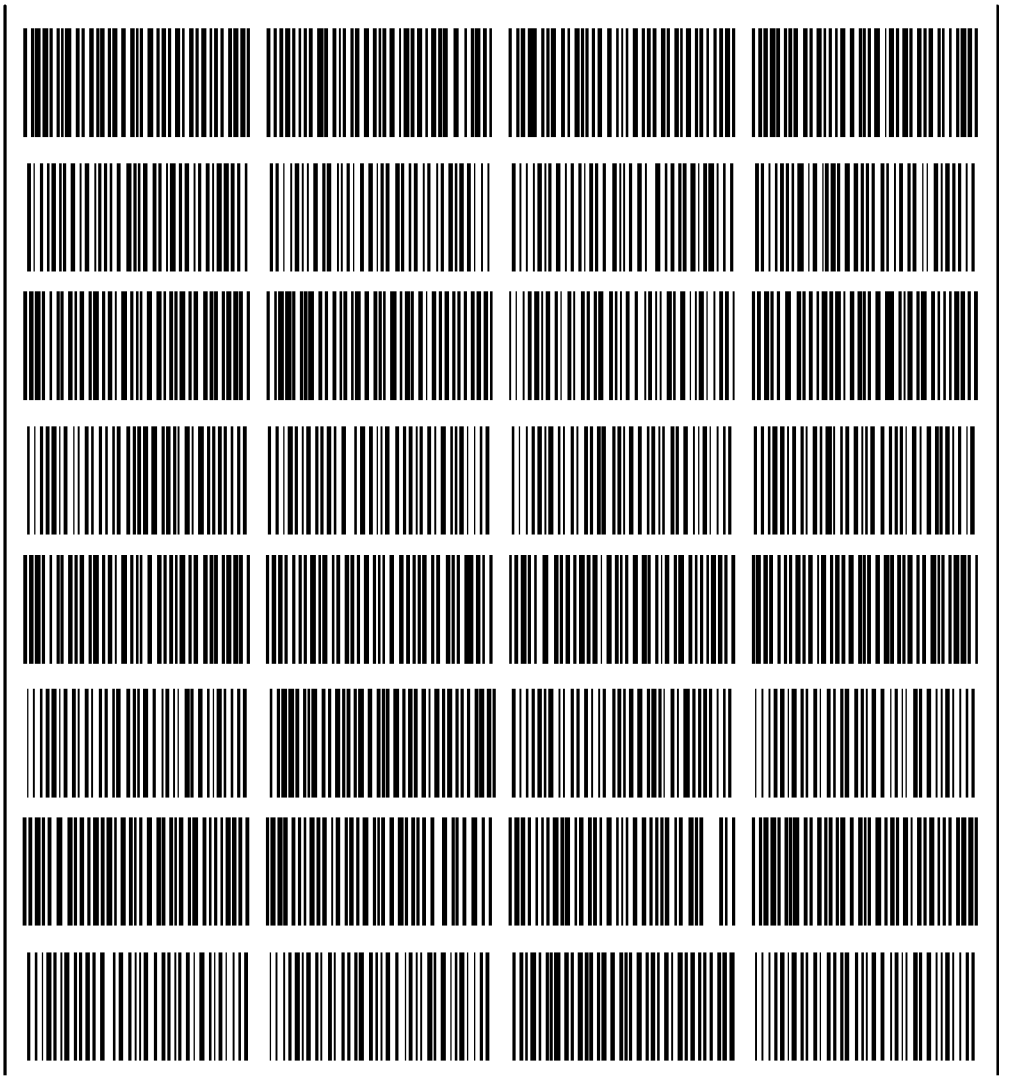


FIG. 1E

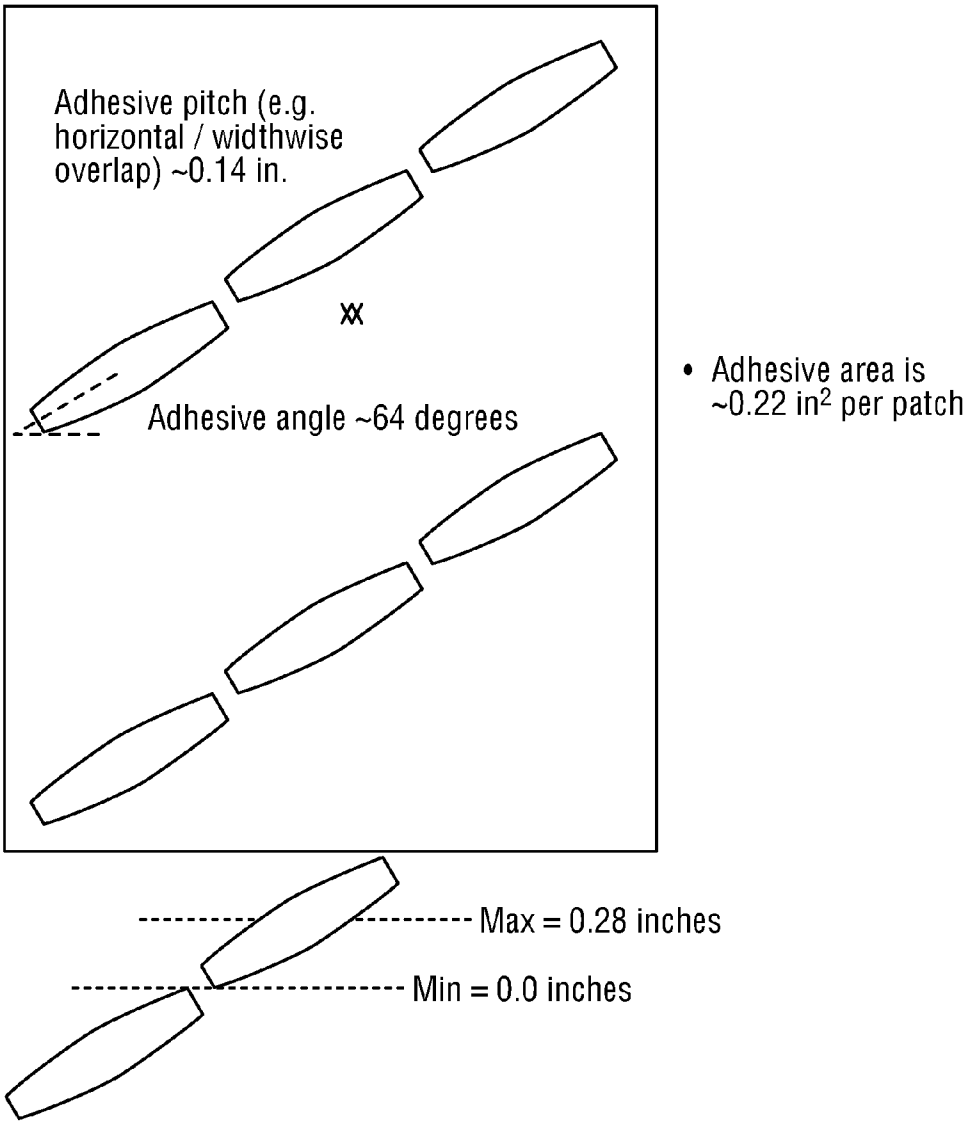

Adhesive pitch (e.g. horizontal / widthwise overlap) ~0.14 in.
Adhesive angle ~64 degrees
• Adhesive area is ~0.22 in^2 per patch
Max = 0.28 inches
Min = 0.0 inches

FIG. 1F

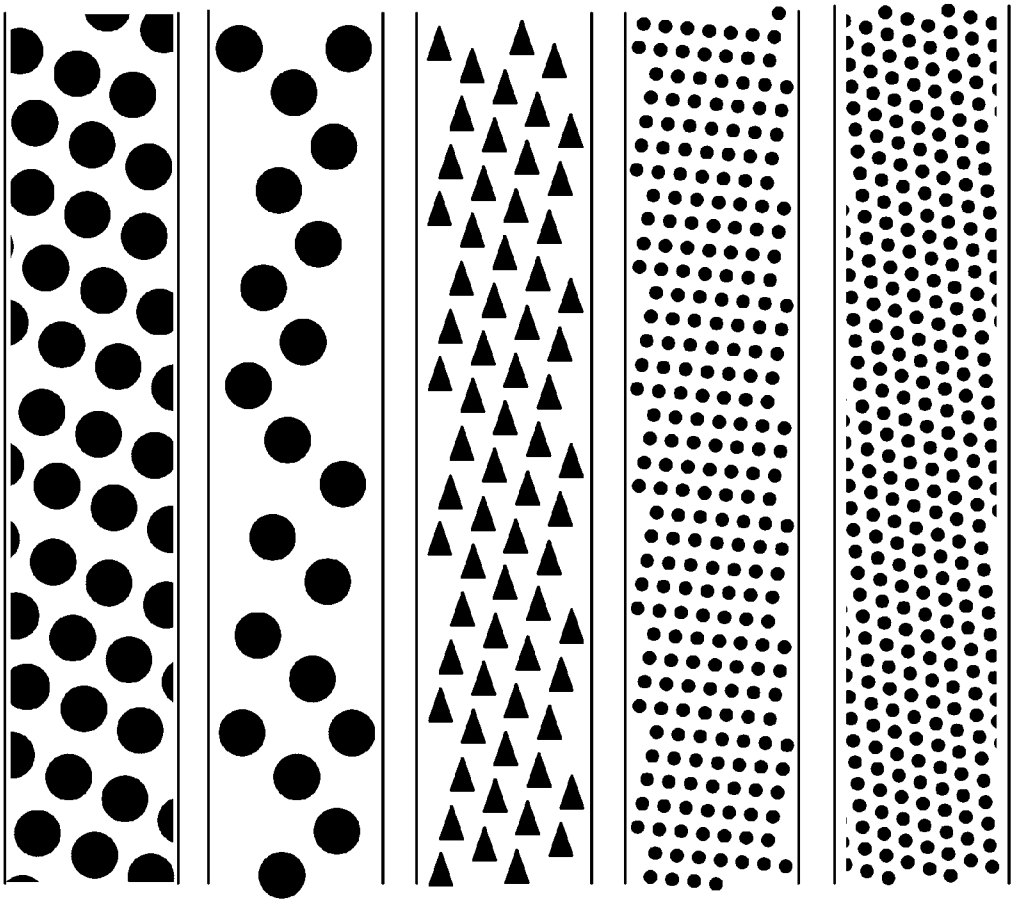


FIG. 1G

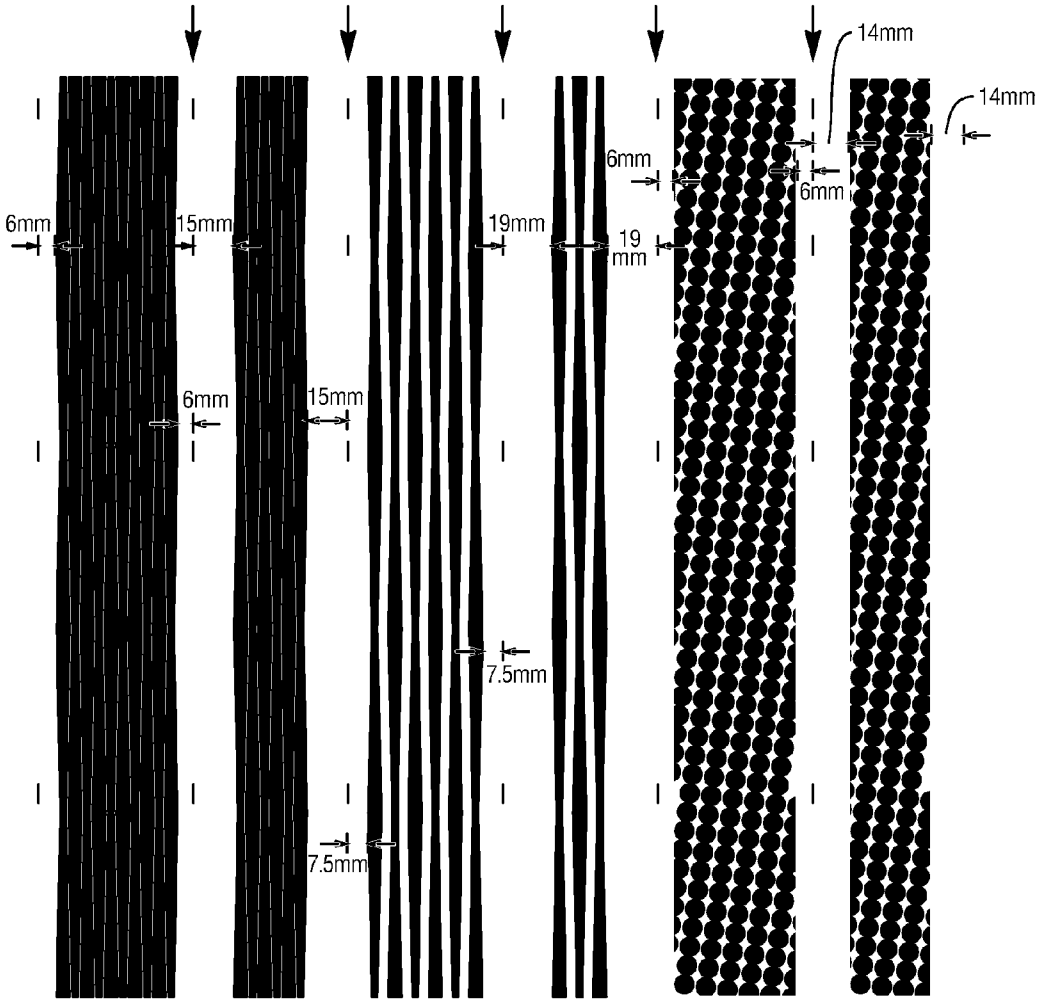
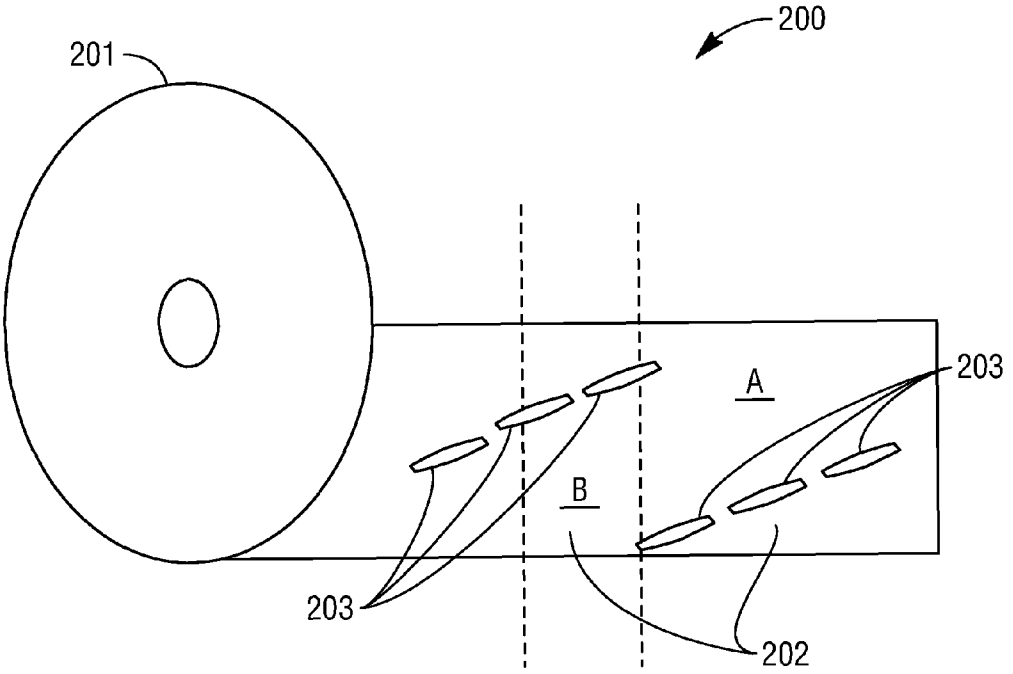


FIG. 1H

FIG. 2



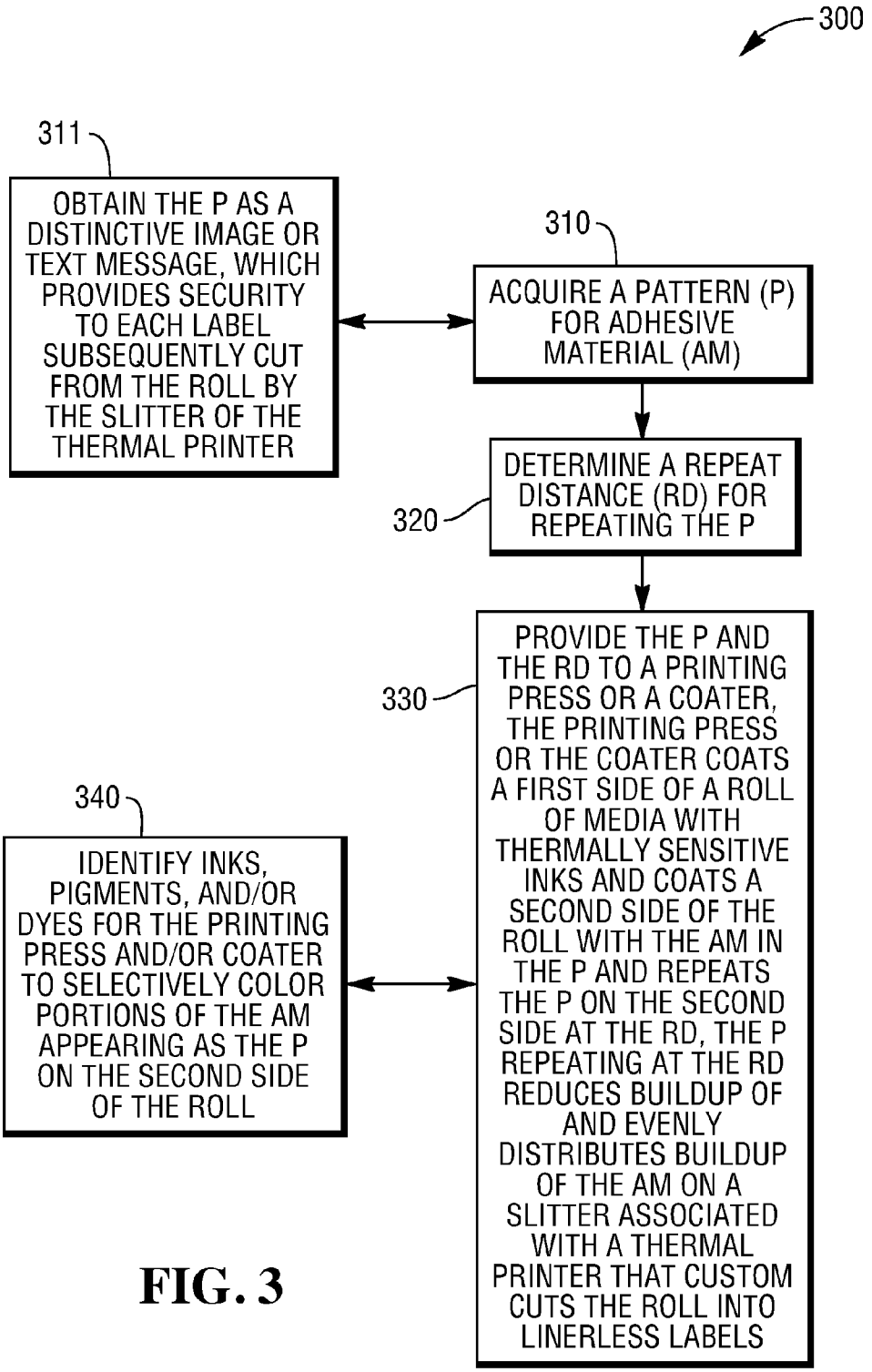

300
311
OBTAIN THE P AS A DISTINCTIVE IMAGE OR TEXT MESSAGE, WHICH PROVIDES SECURITY TO EACH LABEL SUBSEQUENTLY CUT FROM THE ROLL BY THE SLITTER OF THE THERMAL PRINTER
310
ACQUIRE A PATTERN (P) FOR ADHESIVE MATERIAL (AM)
320
DETERMINE A REPEAT DISTANCE (RD) FOR REPEATING THE P
330
PROVIDE THE P AND THE RD TO A PRINTING PRESS OR A COATER, THE PRINTING PRESS OR THE COATER COATS A FIRST SIDE OF A ROLL OF MEDIA WITH THERMALLY SENSITIVE INKS AND COATS A SECOND SIDE OF THE ROLL WITH THE AM IN THE P AND REPEATS THE P ON THE SECOND SIDE AT THE RD, THE P REPEATING AT THE RD REDUCES BUILDUP OF AND EVENLY DISTRIBUTES BUILDUP OF THE AM ON A SLITTER ASSOCIATED WITH A THERMAL PRINTER THAT CUSTOM CUTS THE ROLL INTO LINERLESS LABELS
340
IDENTIFY INKS, PIGMENTS, AND/OR DYES FOR THE PRINTING PRESS AND/OR COATER TO SELECTIVELY COLOR PORTIONS OF THE AM APPEARING AS THE P ON THE SECOND SIDE OF THE ROLL

FIG. 3

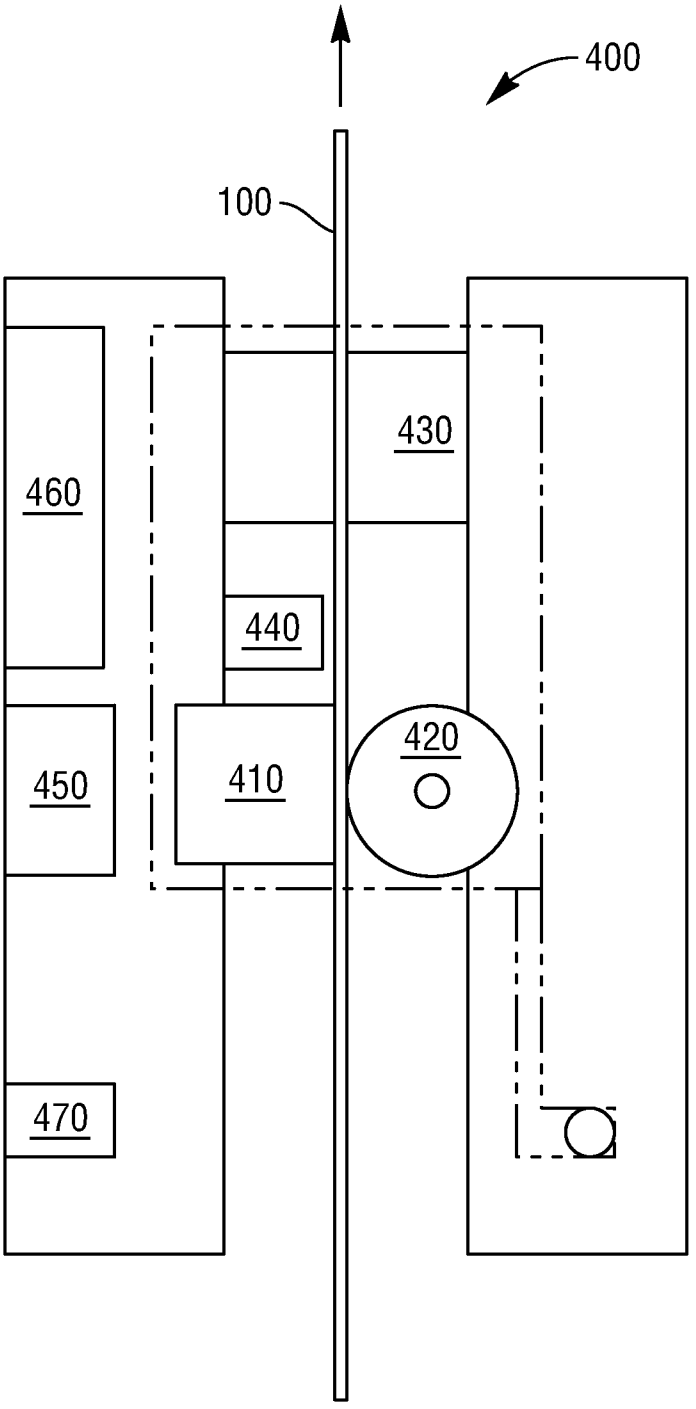


FIG. 4

LINERLESS LABELS

BACKGROUND

Linerless labels are an environmentally friendly labeling solution, avoiding the need for inclusion and/or disposal of a removable release liner. Use of linerless labels may pose a host of problems including increasing the propensity for adhesive build-up in a printer, resulting in printer jams, misfeeds and/or decreased performance.

SUMMARY

In various embodiments, techniques for design, manufacture and/or use of linerless labels are presented. According to an embodiment, linerless label media is presented. The media includes a first portion, and a second portion. The first portion of the media is situated on a front side of the media and includes one or more thermally sensitive coating(s), and may further include one or more coating(s) of release material. The one or more thermally sensitive coating(s) and/or the one or more release coating(s) may comprise one or more flood and/or patterned thermally sensitive and/or release material coating(s). The second portion of the media is situated on a back side of the media and includes one or more coating(s) of patterned adhesive(s). Depending on the embodiment, the release material(s) may be positioned on top of the thermally sensitive coating(s) on the first portion such that, where the media is wound in a roll, the release material lies proximate to and/or covers the patterned adhesive in a similar pattern thereto, and/or as a flood coat.

A label is configured to be cut (e.g., custom cut at a custom length) from a web or roll of the media via a cutting mechanism of, for example, a thermal printer. The pattern of adhesive(s) situated on the second portion of the media is selected to, for example, reduce contact between the cutting mechanism and the adhesive material(s) of the patterned adhesive. The pattern may also be selected to increase the uniformity of contact occurring between the cutting mechanism and the adhesive material(s) over the length of the cutting mechanism (e.g., knife or blade).

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1A-1H** are diagrams of different configurations for linerless label media, according to various example embodiments.

FIG. **2**. is a diagram of a linerless label media making apparatus, according to an example embodiment.

FIG. **3** is a diagram of a method for creating and using linerless label media, according to an example embodiment.

FIG. **4** is a diagram of a thermal printer for thermally printing linerless label media, according to an example embodiment.

DETAILED DESCRIPTION

FIGS. **1A-1H** are diagrams of different configurations for linerless label media, according to various example embodiments. FIGS. **1A-1H** are shown for purposes of illustration only. Further configurations are achievable with the teachings presented herein.

In each of the FIGS. **1A-1H** a back side of linerless label media is depicted. The back side includes a pattern of adhesive material(s) coated thereon. It is also noted that a front side, opposite the back side, exists for each linerless label media depicted in FIGS. **1A-1H**, which front side may include one or more thermally sensitive coating(s), comprising one or more thermally sensitive ink(s), dye(s) and/or pigment(s), that, when thermally activated, may display information, such as information associate with a transaction (e.g., as for a receipt). The front side may further include one or more coating(s) of one or more release material(s), which coating(s) may be provided in flood and/or spot/patterned configurations. Such release material coating(s) may be configured to lie proximate to and/or cover the patterned adhesive when the linerless label media is wound in a roll, facilitating unrolling of the media without the adhesive bonding the back side to the front side. Where provided in patterned configuration, the release material coating(s) may replicate the pattern of the adhesive and thereby selectively cover the adhesive, providing for the above described ease of unwinding, and/or additional readability (human and/or machine) and/or security benefits as described hereinbelow with respect to the patterned adhesive(s). In one embodiment, a pattern of release material is provided on a first media side so as to cover the pattern of adhesive material on a second media side when the media is wound in a roll, wherein such coverage may be in excess of the coverage of the patterned adhesive by a predetermined amount (e.g., 5%, 10%, 20% and the like).

The thermally sensitive coatings(s) on the first side of the linerless label media may be activated by feeding the media (including a longitudinally slit portion thereof) through a thermal (e.g., a direct thermal) printer, such as the thermal printer **400** of FIG. **4**. As shown in FIG. **4**, a thermal printer **400** may include a thermal print head **410**, a platen **420**, and cutting mechanism **430**, such as a knife/blade, a slitter, and the like. The cutting mechanism **430** may be used to custom produce a linerless label of a custom size from installed linerless label media **100**. One (first or front) side of the label may include the thermally sensitive coating(s) (activated or not) and/or release material(s), and the other (second or back) side may include the patterns of adhesive materials, as illustrated with respect to FIGS. **1A-1H**. The linerless label media **100** may be further be provided in a roll.

As shown in FIG. **4**, a thermal printer **400** may further include a motor and/or drive assembly **450** for transporting media **100** through the printer **400** (such as, for example, via driving rotation of the platen **420**), a controller **460** (including, for example, a processor, and static/permanent and/or volatile memory) for controlling operation of the printer **400** (such as, for example, signaling a drive assembly **450** to transport media **100** through the printer **400**; providing a signal to a print head **410** to print particular information on the media **100**; and/or signaling a cutter **430** to cut the media **100** at a location based on a signal provided by a sensor **440** in sensing presence, absence, distribution, and the like of adhesive), and a communication module **470** for receiving print information (e.g., transaction data) and/or commands (e.g., print and/or knife cut commands) from an associated host computer (not shown) and/or providing the same to the controller **460**.

Each label may be configured to be custom cut at a custom length from a web or roll of the media via a thermal printer which includes a cutting mechanism. Further, the patterned adhesive may be configured on the second portion of the media in such a manner so as to reduce and/or vary the contact between the cutting mechanism and the adhesive materials. In some embodiments the patterned adhesive may be configured on the second portion of the media in such a manner so as to uniformly/approximately uniformly distribute any contact occurring between a cutting mechanism and the adhesive material over a length/width of the cutting mechanism over the course of continued use thereof/cutting therewith. Such

use may include cuts across (e.g., perpendicular to) and/or along (e.g., parallel to) the running axis of a web of media, including multiple cuts to produce like and/or varied length labels from such media. The details of this and the patterns are now presented in detail with reference to the FIGS. **1**A-**1**H.

In one embodiment, as depicted in the FIG. **1**A, the patterned adhesive may be coated on a relatively wide web (e.g., a log roll) of label media in elongated diamond shapes, which shapes may interlock (e.g. cross into the region defined by the maximum width of an adjacent shape, with or without physically overlapping at any location), and may repeat at predefined or random distance(s). After production thereof, such web may be slit lengthwise (e.g., along its running axis) at various widthwise positions thereof (e.g., as illustrated in FIG. **1**A by the vertical arrows) to produce various narrower width products (e.g., ~44 mm, ~58 mm, ~80 mm, and like widths) for, for example, end customer use in receipt/label thermal printers.

As shown in FIG. **1**A, a diamond adhesive pattern may be provided. In the illustration of FIG. **1**A, such pattern may be provided on multiple portions of a wide web for, for example, later slitting into a final, narrow width product as illustrated in FIG. **1**B. Likewise, as shown in FIG. **1**B, such pattern may be centrally located across the width of a narrow width product, and may span only a portion of the width of such final product, although variations are possible (see, e.g., FIG. **1**H).

In the embodiment of FIG. **1**A, the portion of media that would become the edges of a narrow, slit label product as in, for example, FIG. **1**B (e.g., following the vertical arrows down the length of the illustration of FIG. **1**A), are free of adhesive to create adhesive free lanes for slitting of the wide with product of FIG. **1**A, and thereby mitigate build-up of adhesive on the slitting mechanism (e.g., cutter, knife, and the like). Variations are possible including where the adhesive pattern is offset with respect to the centerline of a final, slit product, and/or where the adhesive spans the width of the wide and/or final slit product, including where no adhesive free lanes are provided for slitting.

In the embodiment of FIG. **1**B, a narrow web of media, cut, for example, from the wide web of FIG. **1**A, is shown. In FIG. **1**B, three, potential, horizontal cut locations (A, B, and C) are illustrated. Such cut locations may be utilized during and/or result from cutting the web of media of FIG. **1**B to product a label/receipt associated with, for example, three separate transactions, by a cutter or cutting mechanism associated with a thermal (e.g., receipt) printer. As shown, the three cuts would result in three, varied/custom length linerless labels. The first linerless label is represented by the area appearing vertically above the A cut in FIG. **1**B. The second linerless label is represented by the area appearing vertically above the B cut and bounded on the top by the A cut in FIG. **1**B. Finally, the third linerless label is represented by the area appearing vertically above the C cut and bounded on the top by the B cut in FIG. **1**B.

As illustrated in this and other embodiments, problems associated with adhesive buildup on a cutter of a thermal printer can be minimized by patterning the adhesive in a certain manner. For example, the adhesive may be patterned such that the location(s) where the adhesive comes into contact with the cutter may vary with each cut such as, for example, via varying the pattern and/or any repeat of its pattern along the running axis of the web of media, and/or via varying the location of the cut(s) (e.g., as in cut locations A, B and C of FIG. **1**B) including as a consequence of the varied length of material that may be required for a given use (e.g., variation of media length with transactions/receipt details) or purposefully via printer control logic (etc). In preferred embodiments the pattern and or the cutting location through the media should spread the adhesive contact across as much of the cutter as possible (e.g., over time) to minimize deposition in localized regions which may adversely affect subsequent cutter performance and/or media feed (resulting in, for example, media mis-feeds and/or jams).

For example, at position "A" in the embodiment of FIG. **1**B the cutter passes through adhesive in four discrete locations across the width of the media web. At position "C" the cutter passes through adhesive in five discrete locations, different from the locations of position A (e.g., the adhesive areas at position A and C do not coincide and/or overlap). At position "B" the cutter passes through adhesive in nine discrete locations which, in the embodiment of FIG. **1**B, coincide with a portion of each of the locations of positions A and C.

Within the repeat length (if any) of an adhesive pattern, such as that shown in FIG. **1**B (e.g., 202 mm), the adhesive distribution across the cutter is different at each of the different, illustrated cross-web cut locations (e.g., A, B and C). Thus the contact between the adhesive and the cutter from the various cuts is distributed across the cutter and, any buildup its, therefore, not concentrated in a particular area or areas. Spreading the adhesive, and any resultant buildup, over the width of the cutter increases the number of cuts required to reach a problem amount of buildup, thereby minimizing the occurrence of associated problems. Further, cutting through regions without adhesive, which adhesive free regions may also vary with different cross-web cut location (e.g., locations A, B and C in FIG. **1**B), can assist in cleaning/removing any previously deposited adhesive therefrom.

In addition to mitigating problems associated with adhesive build-up on a printer cutter, selectively patterned adhesive may minimize adhesive buildup on other portions of a printer along a media feed path (e.g., rollers, platens, print heads, and the like), thereby mitigating problems (e.g., media mis-/choppy feed, jams, and the like) associated therewith. Patterned adhesives can reduce these problems.

Patterning the adhesive can also reduce the amount (e.g., surface area) of adhesive in contact with various surfaces and/or portions of the thermal printer. This may allow the use of tackier adhesives without additional printer (e.g., jamming and/or mis-feed) problem.

In addition, patterned adhesive may mitigate issues associated with print media jamming as a result of adhesive bonding/the bond strengthening over time such as, for example, between the period of time when a final print is made on a first day and a period of time when a print is first attempted to be made on a second day.

Depending on the embodiment, it may be desirable to avoid having the repeat length of the adhesive pattern the same or approximately the same as the length of a typical label/receipt such as, for example, where the same length label/receipt is printed/produced repeatedly. This would cause the same part of the cutter to pass through adhesive with every cut, potentially, depending on the embodiment, negating some of the benefits of the patterned adhesive. This problem can be avoided by going to long repeat lengths in the adhesive pattern, and/or randomized adhesive patterns.

FIG. **1**C illustrates various variations in the repeat length of an adhesive pattern. For example, the left pattern in FIG. **1**C shows a short repeat length. The center pattern illustrates an adhesive pattern with a modified, increased repeat length. Finally, the right pattern illustrates an adhesive patter with a further modified, increased repeat length. Note, depending on the embodiment, the repeat length may be varied (including increased) without varying the overall nature (including design) of the pattern. Varying the repeat length with respect

to an expected cut length/location (e.g., long repeat lengths for typically short receipts) can avoid repeatedly cutting through the same location of a patterned adhesive, and thereby avoid localized/heavy adhesive buildup. The likelihood of a typically short, cut media portion (e.g., label/receipt) length equaling a long adhesive pattern repeat length, and thereby having a cut fall on a similar portion of the pattern, is small. It should be noted that, where possible, repeatedly cutting media portion (e.g., label/receipt) lengths which are and/or are expected to be an integer multiple of the repeat length should be avoided. Likewise, repeat lengths should be selected such that they are longer than, and not an integer multiple of, typical/expected cut media portion (e.g., label/receipt) lengths.

Permissible repeat lengths may be limited depending on the apparatus used to manufacture label media, including applying an adhesive pattern to a substrate/web. For example, for a rotary printing press, the maximum repeat length may be limited to the circumference of the cylinder used to apply the adhesive to the web.

In an embodiment, a gravure coater may be modified to put down a patterned coating (e.g., adhesive). The "normal" gravure cylinder may be replaced by a banded gravure cylinder. A banded gravure cylinder has bands of gravure cells with un-engraved areas between the bands. The absence of gravure cells results in no coating in that area. In a similar manner, patterns may be produced by placing gravure cells in the mirror image of the desired pattern. In essence, a patterned gravure cylinder turns a gravure coater into a simple one-station gravure press.

The functionality of an adhesive pattern can be further enhanced by placing or otherwise encoding human or machine readable information in the pattern. This is illustrated with respect to FIG. **1**D and FIG. **1**E. FIG. **1**D shows an adhesive pattern as a series of company logos. In FIG. **1**D, the shape of the adhesive comprises a logo (other shapes and sizes, and/or information content(s) are possible), while the pattern thereof is set to distribute the adhesive across the cutter such that cutter contact with adhesive is different at every potential cut-off position within the repeat length of the pattern. In addition to mitigating printer jams and cutter deposition/fouling issues, this configuration provides a methodology for providing for brand recognition and/or document security as it is more difficult to print adhesive than inks, and therefore more costly/difficult to counterfeit. For example, the pattern of FIG. **1**D would be extremely difficult to be counterfeited on a personal computer/printer.

Further, adding coloration (e.g., dyes and/or pigments) to the adhesive can make the image more visible/attractive, enhance machine readability, and/or further enhance the security aspect. For example a printed textual and/or graphical image (e.g., NCR in FIG. **1**D) may be provided using a green colored adhesive, and thereby be read/viewed directly, and/or with a suitable (e.g., green) spectrum reader. Likewise, security dyes and/or pigments (e.g., ultraviolet (UV) and/or fluorescent) may further enhance the security aspect of the adhesive image, including machine readability. It should be noted that in further embodiments, the shape of the adhesive can be any human and/or machine readable text and/or graphic. Likewise, depending on the shape/characteristics thereof, various information may be encoded in the adhesive and/or its pattern, and/or represented/provided by it.

FIG. **1**E illustrates a further embodiment of including information in and/or as a result of the shape of the adhesive via using an adhesive pattern comprising (e.g., machine-readable) barcodes. In the example of FIG. **1**E, the adhesive image is a 1-D (one dimensional) barcode followed by the inverse image of the same barcode. Such alternating pattern distributes the adhesive across the web in a desired (e.g., non-uniform) manner. As described above, depending on the embodiment, the adhesive may include one or more colorants (e.g., dyes and/or pigments) and/or security markers (e.g., fluorescent dyes and/or pigments) to enhance its human and/or machine viewing/readability. Additionally or alternatively, the substrate surrounding the adhesive pattern may be colored to render the bar code (or other image/pattern) human and/or machine readable, and/or enhance its human and/or machine readability. Such coloring may occur via application of, for example, a water-based coating which may preferentially be absorbed by the substrate surrounding the patterned adhesive, as opposed to the adhesive itself. Such surrounding coloration, including via visible and/or security dyes and/or pigments, makes the barcodes visible to a human and/or machine (e.g., scanner). As stated above, this approach may be used to provide additional security features to a linerless label/receipt. It should be noted that while 1-D barcodes were used in this example, the concept can readily be extended to 2-D barcodes and/or other shapes and/or patterns.

In various embodiments, the machine readable nature of the patterned adhesive may be used to augment use of the physical characteristics of the pattern via triggering a cut of the media to minimize adhesive contact and/or deposition. For example, in various embodiments, features of the adhesive pattern (e.g., presence of adhesive, absence of adhesive, distribution of adhesive, repeat length, including relative location therein) may be sensed (e.g., by a sensor **440**, such as an optical sensor, of a thermal printer **400**) and a cut location selected to maximize variation of the cut location, such as with respect to the repeat length, and thereby minimize deposits and their resultant deleterious effects. In addition, depending on the pattern, a cut-wise "gap" in the pattern may be sensed (e.g., as between adjacent bar codes in FIG. **1**E) and a cut made therein. Likewise, periodic "cleaning" of the print surfaces (e.g., cutter) may be performed by variously and/or alternately selecting cut portions having, for example, a mirror imaged adhesive pattern to that recently, and/or in aggregate formerly, cut through in order to wipe the adhesive contacted areas with non-adhesively coated media portions, and thereby clean the cutting surface(s) of prior deposits. Further, sensing of an adhesive pattern may be performed to cut through a clear or near-clear (or other desired) region irrespective of what the particular print job (e.g. transaction receipt) may require in order to periodically and/or systematically (e.g., when a cut is called for proximate to such a region) clean the entire cutter width and/or minimize new deposition, maximize the variability of the portion of the adhesive pattern cut through, and the like.

The FIG. **1**F shows a further embodiment of a patterned adhesive. Here, a predefined shape of adhesive (shown in the embodiment of FIG. **1**F as having two parallel and two convex sides, although other shapes/sizes are permissible) is organized in sets (of, for example, three) having predefined dimensions and situated at predefined angles and pitches within the media roll or web. Additionally, the predefined sets are spaced at predefined distances from one another along the running axis of the roll/web. For the embodiment/dimensions depicted in the FIG. **1**F, the probability of no adhesive contact with a cutter is 3%, the probability for maximum adhesive contact is 14%, and, significantly, the probability of achieving between the maximum and minimum (e.g., random) contact is 97%.

FIGS. **1**G and **1**H show further embodiments of patterned adhesive for, for example, use in linerless labels. In FIG. **1**G, various adhesive shapes (e.g., circles and triangles), and

sizes/distributions thereof, on a second side of a narrow media product are shown. In addition, for all of the configurations of FIG. **1**G, the patterned adhesive approximately spans the width of the respective illustrated media products, although variations, such as where such patterns span less than the entire width and/or are biased and/or confined to a particular centerline/running axis side, are possible.

FIG. **1**H illustrates a wide web of patterned adhesive media having a multitude of different adhesive patterns thereon. Such wide web may be produced by, for example, a gravure coater/press as, for example, described hereinabove. Further, individual (e.g., six in the illustrated embodiment), narrow web products (e.g., for end use in a thermal printer) may be slit from the wide web, or it may be used as produced. In an embodiment, six narrow web products may be slit from the wide web product following and along the direction of the arrows on the top of FIG. **1**H.

As shown in FIG. **1**H, various adhesive patterns may be produced utilizing having similar, or different, overall elements shapes. For example, the left four patterns all include variations of diamond shaped adhesive. Likewise, the right two patterns both include variations of circular shaped adhesive. In the left four configurations, coverage of the adhesive pattern is varied via varying the uncoated media portion within the region of the media coated with adhesive (e.g., within the overall width of the adhesive band), as well as via varying the size of the region itself (e.g., the width of the adhesive with respect to the width of the web/to-be-slit portion thereof). The right two configurations illustrate variations in coverage with respect to the width of the adhesive band as compared to width of the web/media. In all instances, the illustrated band of adhesive is centered/approximately centered on the width of what would be the narrow media product when the wide web is slit as indicated. Variations are, however, possible, such as where the illustrated band(s) of adhesive are biased with respect to the center of the to-be-cut, narrow web portions, including being baised to one side thereof (including being located proximate to an edge of a to-be-cut, narrow web portion).

As illustrated with respect to the configurations of FIG. **1**H, the overall width of a band of adhesive may vary with respect to the width of the web of media, whether taken as a wide web or one or more narrow webs that may be slit therefrom. For example, in various embodiments, the width of a band of adhesive may span a portion of the width of a web of media, including spanning an amount equivalent to approximately 20%, 25%, 50%, 66%, or 80% of such width, and the like. In one embodiment, the width of the band of adhesive is set to be not more than 50% of the width of the web (wide or narrow) of media. In another embodiment, the width of the band of adhesive is set to be not less than approximately 80% of the width of the media web. Variations are possible.

It can be now appreciated that linerless labels can be constructed via patterned adhesive for purposes mitigating deleterious effects of adhesive contacting various portions of a printer including, among other things, a cutter. Likewise, cutting thereof may be performed without sense marks and/or may be performed using the patterned adhesive as a sense marks, further enhancing the beneficial effects. Further, as described hereinabove, a gravure coater/press may be used to prepare a web of patterned adhesive media.

FIG. **2**. illustrates a diagram of linerless label material **200**, according to an example embodiment. While the linerless label material **200** is described hereinbelow with respect to the patterned adhesive of FIG. **1**F, the linerless label material **200** may comprise any of the configurations depicted for the patterned adhesive media in FIGS. **1**A-**1**E and/or **1**G-**1**H.

The linerless label material **200** includes a roll or web of media **201** comprising patterned adhesive media in roll form and, thereby, laminated to itself. Linerless label material **200** may be used to provide a series of individual linerless labels **202** (identified as, for example, the regions of unrolled media marked as "A" and "B" in the FIG. **2**). Each of these components and their relationship to one another is now discussed in detail below with reference to the FIG. **2**.

In various embodiments, the roll of media **201** includes a front side or portion having one or more thermally sensitive coatings (not shown) and a back portion (visible in the FIG. **2**) with repeating patterns of adhesive materials **203**. A label **202** (shown as, for example, A and B in FIG. **2**) may be custom cut from the roll of media **201** by, for example, a cutter of a thermal printer, at custom lengths. The front portion of the label **202** (not shown in the FIG. **2**) may further display information (e.g., from a transaction) when the thermally sensitive coating is activated by a thermal print head of the thermal printer.

Once printed/cut, the back portion of a label **202** may permit the label **202** to be affixed to another surface (e.g., carton, container, surface, or substrate) via the adhesive materials. Moreover, the repeating patterns **203** of the adhesive materials are configured or situated on the back portion of the roll of media **201** so as to minimize contact between various surfaces of a thermal printer, such as a cutter blade, and the adhesive materials each time the thermal printer custom cuts a particular label (A or B) from the roll of media **201**.

According to an embodiment, the repeating pattern **203** may include information (e.g., via a particular pattern, graphic, text or the like) that is visibly conveyed, or that can be acquired via a scanning device from the adhesive material (such as, for example, via a bar code scanner when the repeating pattern **203** is a bar code as described with respect to FIG. **1**C hereinabove).

Further, in various embodiments, some or all of the adhesive material(s) may include colorants to make portions of the adhesive materials visible to the naked eye or visible when exposed to UV light or different predefined frequencies of light.

In a particular case, such as what was discussed above with reference to the FIG. **1**F, at least one of the patterns may be configured to have a predefined maximum width, a predefined minimum width, a predefined pitch, a predefined angle, and have respective repeating patterns be separated from one another by a predefined distance on the roll of media **201**. This statistically improves the exposure of the cutting mechanism in the thermal printer to the adhesive material at various locations each time a cut is made on the roll of media **201** to produce a linerless label **202**.

In yet another situation, the distance between the repeating patterns is configured to be large enough so as to exceed a maximum length for any custom linerless label **202** that produced from the linerless label material **200**.

FIG. **3** is a diagram of a method **300** for creating and using a linerless label (such as the linerless label **202** of FIG. **2**), according to an example embodiment. The method **300** (hereinafter "labeling process") is implemented in one or more machines adapted to process print media. The labeling process produces and uses the linerless labels discussed with respect to FIGS. **1**A-**1**G and FIG. **2**.

At **310**, the labeling process acquires a pattern for adhesive material. This can be preconfigured into the machine that executes the labeling process (e.g., via a banded gravure cylinder) or it can be acquired from a database based on the identity of a customer, type of roll or web of media, end use(s) (including printer design/type), and the like.

In one case, at **311**, the labeling process obtains the pattern as a distinctive image or text message, which provides security to each label subsequently cut from the roll of media by the slitter or cutter of the thermal printer.

At **320**, the labeling process determines a repeat distance for the pattern. Here, the repeat distance can also be a machine configuration parameter, a profile for a customer based on largest known size for a receipt on a cut label, a parameter based on end use (including printer) requirements, and the like.

At **330**, the labeling adhesive process provides the pattern and the repeat distance to an adhesive application device (e.g., a printing press or a coater). The printing press or coater may, then, apply a thermally sensitive coating to the first side of the media and/or (including subsequently) coat a second side of the media with the adhesive material in the acquired pattern. The printing press or coater uses the repeat distance to repeat the adhesive pattern on the second side of the roll of media.

The repeating pattern at the repeat distance on the second side of the media assists in reducing buildup of and/or evenly distributing of any buildup of the adhesive material on a slitter or cutter (or other surface) associated with a printer (e.g., a thermal printer) that subsequently prints and/or custom cuts the roll into linerless labels.

According to an embodiment, at **340**, the labeling process **300** may also identify colorants (e.g., inks, pigments, and/or dyes) for the printing press and/or coater to selectively color portions of the adhesive materials appearing as the pattern on the second side of the roll. Again, this can be used to reduce counterfeiting and improve linerless label security, as well as provide for improved human and/or machine readability.

The above description is illustrative, and not restrictive. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of embodiments should therefore be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

The Abstract is provided to comply with 37 C.F.R. §1.72(b) and will allow the reader to quickly ascertain the nature and gist of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims.

In the foregoing description of the embodiments, various features are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting that the claimed embodiments have more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus the following claims are hereby incorporated into the Description of the Embodiments, with each claim standing on its own as a separate exemplary embodiment.

The invention claimed is:

1. Label media, comprising:

a substrate having a first and a second side opposite the first side;

a thermally sensitive coating on the first side of the substrate; and

an adhesive layer on the second side of the substrate;

wherein the adhesive layer is variably patterned to include areas with adhesive and areas without adhesive to vary locations of contact between the adhesive layer and a cutting mechanism making variably located lateral cuts across width of the substrate.

2. The label media of claim **1**, wherein the adhesive is configured to be applied to the second side of the substrate via a banded gravure cylinder coating device.

3. The label media of claim **1**, wherein the areas without adhesive comprise adhesive free lanes arranged vertically and/or horizontally within the adhesive layer.

4. The label media of claim **1**, wherein the areas with adhesive comprise elongated diamond shapes stretching vertically across the second side.

5. The label media of claim **1**, wherein the areas with adhesive are configured to repeat on the second side at intervals that exceed lengths associated with individual labels cut therefrom.

6. The label media of claim **1**, wherein a repeat length for the areas with adhesive is configured to be equal to a circumference of a gravure cylinder used to apply the adhesive to the second side of the media.

7. The label media of claim **1**, wherein the adhesive is configured to provide information.

8. The label media of claim **7**, wherein at least a portion of the adhesive includes a dye, pigment, and/or ink to render the information readable.

9. The label media of claim **7** wherein the adhesive is configured as a logo.

10. The label media of claim **1**, wherein the adhesive is configured as custom repeating text and/or images, the text and/or images patterned to provide a mechanism for detecting counterfeiting of the media.

11. The label media of claim **1**, wherein the adhesive layer comprises a series of repeating bar codes and an inverse of the bar codes, the bar codes capable of being machine read for information represented thereby.

12. The label media of claim **11**, wherein the regions surrounding the bar codes includes color from a water based marker which is read to discern information represented by the bar code.

13. The label media of claim **1**, wherein the adhesive layer comprises a repeating series of three adhesive patches with each patch being at a predefined angle and predefined pitch, each repeating series separated by a predefined distance along a running axis of the media, and each patch having a predefined minimum width and a predefined maximum width.

14. A label making apparatus, comprising:

a roll of media having a front portion including thermally sensitive ink, and a back portion having repeating patterns of adhesive material coated thereon; and

a label configured to be custom cut from the roll of the media by a thermal printer at custom lengths, the front portion displaying information for a transaction when the ink is activated by the thermal printer and the back portion permitting the label to be affixed to an object via the adhesive material, the repeating patterns of the adhesive material configured on the back portion to minimize contact between a cutter blade of the thermal printer and the adhesive materials each time the thermal printer custom cuts a particular label from the roll of the media.

15. The label making apparatus of claim **14**, wherein the patterns of adhesive material include information that is visible or that can be acquired from the adhesive material via a scanning device.

16. The label making apparatus of claim **15**, wherein select portions of the adhesive material includes ink to make the portions visible.

17. The label making apparatus of claim **14**, wherein at least one of the patterns is configured to have a predefined maximum width, a predefined minimum width, a predefined pitch on the back portion, a predefined angle on the back

portion, and be separated from another of the repeating patterns by a predefined distance.

18. The label making apparatus of claim **14**, wherein distance between the repeating patterns is configured to be larger than a maximum length for any label made by the label making apparatus.

19. Label media, comprising:

a substrate having a first and a second side opposite the first side;

a thermally sensitive coating on the first side of the substrate; and

adhesive on the second side of the substrate;

wherein the adhesive is variably patterned on the second side of the substrate to vary locations of contact between the adhesive and a cutting mechanism making variably located lateral cuts across width of the substrate, the pattern comprising a column of circular dots diagonally oriented along the running axis of the substrate.

20. Label media, comprising:

a substrate having a first and a second side opposite the first side;

a thermally sensitive coating on the first side of the substrate; and

adhesive on the second side of the substrate;

wherein the adhesive is variably patterned on the second side of the substrate to convey information and to vary locations of contact between the adhesive and a cutting mechanism making variably located lateral cuts across width of the substrate.

* * * * *

Exhibit D

McDonald's USA LLC

Date: February 21st, 2014
To: NCR
From: US IT Supplier Management
Subject: **Sticky Receipt Paper Pilot Begins March 3rd, 2014**

Sticky Receipt Paper Pilot Begins March 3rd, 2014

Beginning March 3rd 2014, US IT Supplier Management will be conducting a controlled pilot of sticky receipt paper from a new supplier, Documotion Research, Inc. (DRI). This pilot has been approved by McDonald's Corporation and various McDonald's Store Technology Board committees.

This pilot will occur in 1,750 restaurants across three Markets – Southern California (70), Stratford, CT (50), and Tampa, FL (57) for approximately two (2) months. The Houston region (#38 – Conroe) may be considered as a candidate for this pilot and McDonald's will inform NCR if this market will be used. During this time, NCR Sticky Media – Super Sticky is unavailable for order fulfillment in the DC's. Restaurants will be instructed to set aside any NCR Sticky Media – Super Sticky for the duration of this pilot.

Should escalations specific to Sticky Receipt Paper arise from restaurants within the aforementioned pilot markets, you are to contact US IT Supplier Management at 630.623.6293. Please provide restaurant NS # and point of contact.

If you have any questions regarding this controlled pilot, please contact John Graves at 630.623.6293

Exhibit E

SIDE 2

GRILL SLIP Time: 12:07

KS # 3 FC # 35

Cheeseburger
NO Pickle